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The Social and Industrial History of Scotland

From the Union to the Present Time

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PREFACE

In a recently published work (Messrs Blackie & Son) the author reviewed the Social and Industrial History of Scotland from the earliest times to the Union. In the present work he reviews this branch of Scottish History from the Union to the present time.

There is room for such a work, in view of the widespread interest at the present time in social and industrial history, and the lack of an adequate review of that of Scotland during the last two centuries. The valuable works of Sir Henry Craik and Dr Mathieson do not go beyond 1843, and are, besides, largely concerned with politics in church and state. The special work of Mr Bremner on *The Industries of Scotland*, published in 1869, is full of valuable information as far as it goes, but is rather ill-arranged and ill digested. The half century from 1869 to the present time has been largely left in abeyance by the historian. It is one of extraordinary and complicated development, particularly in the industrial sphere, and should appeal strongly to the reader of to-day, inasmuch as it is bound up so closely with his own experience.

The lack of special works on this part of the period has made the writing of this one no easy task. The Author has had to search over a wide field for his material, and has found difficulty at times in obtaining first-hand information. He has by no means exhausted the field, and professes only to give a review which, while intended for the general reader, as well as for teachers and students of Scottish history, may serve as an introduction to farther intensive study. To this end, he has added, at the conclusion of each part, a list of sources from which he has drawn his material.

He desires to express his obligations to many friends from whom he has received valuable information in the course of his studies—in particular, to his colleagues, Professors Wallace and Hudson Beare; Dr Oliver, Principal of the South of Scotland Central Technical College; Dr David Murray, Glasgow; Sir John Lindsay, D.L., Town Clerk of Glasgow; Mr Paton, City Chamberlain, and Mr Fenton, Depute City Chamberlain, Edinburgh; Sir John Ross, LL.D., Dunfermline; Mr J. L. Innes, Kirkcaldy; Mr James E. Bell, Mr Duncan McGlashan, and the late Mr David Deuchars, M.V.O., Edinburgh; Mr Nicholson, Librarian, Mr Cuthbertson, Assistant Librarian, and the Staff of Edinburgh University Library. To Mr James A. R. MacKinnon, LL.B., Advocate, he is indebted for valuable legal information and for useful suggestions in the course of reading the proofs.

EDINBURGH, *February, 1921.*

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THE SOCIAL AND INDUSTRIAL HISTORY OF SCOTLAND

PART I

THE EIGHTEENTH CENTURY

1. General Aspect

Looking merely on the surface, the eighteenth, compared with the seventeenth, might be described as a tame century. Apart from the two Jacobite Risings in 1715 and 1745, it is singularly undramatic. Politics lapsed to the level of the petty animosities of Whig and Jacobite and these gradually died away after the cause of the exiled Stuarts had received its death blow at Culloden. Jacobitism survived only in the romantic songs in which a sentimental allegiance to an impracticable ideal found pathetic expression. The Union from which so much had been hoped, and for which so much had been sacrificed, seemed for long a failure, and only five years after its consummation a proposal was made in the Parliament at Westminster to dissolve it. The eagerly expected prosperity did not come till well into the century. The people had not the same interest in politics as in the days when political and ecclesiastical affairs were debated and decided in the Scottish Capital. Scottish members and purely Scottish questions figured little in the greater assembly at Westminster, where Scottish interests were

viewed by English politicians from the standpoint of those of English parties. The limitation of the franchise to a handful of voters in both burghs and counties (about 4000 in all) deprived politics of the magnetic attraction of the days before the Union and the Revolution, when men and parties contended over questions of such far-reaching importance in Church and State. This political lassitude endured throughout the century when Scotland, in marked contrast to the previous century, submitted to the bureaucratic régime of " uncrowned kings " like Henry Dundas.

Happily, this stagnation was confined, except in the political sphere, to the first half of the century. The second half of it was a period of new vitality—which showed itself in a marked transformation of the national life. The Union at last proved its efficacy in the quickening of commerce, of which Glasgow was the great centre. Industry made a great bound forward in the rapid development of the linen, woollen, cotton, and iron manufacture to which the application of improved machinery and especially the inventive genius of James Watt gave a powerful impulse. Agriculture shared in the advance of other industries in a remarkable degree. Shipbuilding and the improvement of communication by land by the construction of roads and canals greatly favoured commercial and industrial expansion and social progress. In literature, science, philosophy, art, education, Scotland sprang from the mediocrity of former days into a brilliant position among the nations. Its social life also underwent a marked betterment in many respects as the result of the accumulating wealth which raised the rate of wages and the standard of living. Its religion lost much of its old narrowness and crudeness under the influence of a broader culture. The energy which in the previous century had exhausted itself with such grim intensity in violent political and ecclesiastical contention was directed into the channel of practical life. The second half of the eighteenth century equally with the seventeenth may be described as a period of revolution. Only the revolution takes the form, not of a convulsion of the body politic, but of a truly formative, if less obtrusive process of industrial and social advance.

2. The Progress of Agriculture.

During the first half of the eighteenth century there was no appreciable advance in agriculture, though enterprising and enlightened landowners like Adam Cockburn of Ormiston, and his son John, and the Earl of Haddington set a praiseworthy example in adopting new methods to increase the productiveness of their estates. Their example was, however, but sparingly followed, and it is only in the second half of the century that a notable advance becomes observable. Even towards its close it was far from complete, the old methods surviving alongside the new in the more sequestered districts of the Lowlands, not to speak of the Highlands. A variety of adverse conditions worked against progress in the earlier part of the century. As the result of a series of inclement seasons at the end of the seventeenth and the beginning of the eighteenth, large tracts of land went out of cultivation and were for long left in a waste condition. Till far into the century the method of tilling the soil was still very primitive. The plough in use varied with the district. But it was usually a cumbrous implement which required four or more horses or oxen to draw it, one man to hold it, another, walking backward, to lead the team, and a third, or even a fourth, to follow it and compress the furrow and break the clods. Sometimes the crooked spade, or cascroin, worked with the hand, was used instead of the plough and the turning over of the soil involved an immense amount of manual labour. The harrows had wooden teeth which wore quickly away and merely scratched the stiffer soils. In some northern districts they were tied to the horses' tails to save the expense of providing harness.

The system of cultivation, like the mode of ploughing and harrowing, was also of a primitive kind. The farm was usually divided into "infield" and "outfield." Infield was the land nearest the steading which absorbed all the farm manure and was perpetually under crop. The outfield was the pasture land beyond, which was occasionally ploughed in patches for corn for four or five years running, when it was exhausted and then left

for some years in pasture till it recovered. The system of "runrig" was also in vogue, under which a number of tenants living in a town or village cultivated the adjacent land, divided into "rigs" or ridges which changed hands every year—a practice very adverse to enterprise on the part of the individual cultivator. Another common method was to lease a farm to a number of tenants, each cultivating his separate portion, but each dependent on the consent of the others in the working of it.

The land was usually leased to tenants by the year and this short and uncertain tenure tended to discourage enterprise. As the cultivator might be turned adrift at the end of the year, he had no incentive to improve the land, and if, nevertheless, he attempted to do so, his rent might be raised. Without a reasonably secure tenure in the form of longer leases, agricultural improvement was impossible. What could be done by this expedient was conclusively shown by Adam Cockburn of Ormiston, Lord Justice Clerk at the beginning of the century, whose wise policy was continued and extended by his son John, with most beneficial results to both landlord and tenant. The generality of proprietors were, however, all too slow to profit from such an example. Moreover, rents were paid largely in kind and only to a comparatively small extent in money. Money was, indeed, very scarce throughout the first half of the century and without money it was impossible for the proprietors to improve their estates. Loans for such a purpose were very difficult to raise and could only be obtained on "wadset," which pledged the land of the borrower to the lender if the loan was not repaid by a specified date. The enterprise of the tenant was farther hampered by the remains of the feudal obligation that persisted from past centuries. Serfdom had long disappeared in the sense of binding the tiller of the soil to the estate and selling him along with it. But restrictions remained which greatly impeded his economic freedom even in the eighteenth century. Part of the rent was paid not merely in kind, but in service, which bound the tenant to give so many days' work to the proprietor in manuring and ploughing the home farm, reaping his crops, carrying peats or coals to the mansion house, such service being included in the general term *arrage and carriage*. "Bondage

days " and " Bonnage " were the significant terms also applied to these services. No less grievous was the custom of " thirlage "—another remnant of feudal times—which obliged the tenant to pay to the barony miller a certain proportion of the grain he produced (multure) whether ground at his mill or not, in addition to the miller's charges for the corn actually ground by him.[1] He was also " thirled " to the local smithy and had to pay annually so much in kind to the blacksmith for plough irons and shoeing of horses though he might not have made use of his services. These dues and services were not only felt to be very vexatious and gave rise to much ill-feeling and contention. They were a serious bar to productive energy.

Lack of sufficient care in cleansing the soil of weeds greatly lessened production and one inveterate weed called gool was all too common in spite of laws punishing those who neglected to keep it down and of gool courts, which survived in some parishes till the end of the century, to inflict the penalties on offenders. Another drawback was the lack of proper means of transit owing to the bad roads, and of serviceable vehicles. Goods were carried in sacks or creels on the backs of horses, or in tumbrils with wooden wheels which revolved with the axles. It was in this primitive fashion that manure was transported to the fields and peats from the moss. Carts were not in common use in the Lowlands till 1760, while in the north the old method of locomotion lasted much longer. The absence of proper drainage prevented the farmer from making adequate use of the low-lying, swampy ground, and led him to cultivate the poorer land on the hill sides. He sowed this land with the least productive kind of grain—grey oats and bere—whilst the late ploughing and sowing resulted in late and precarious harvests. Before the general sowing of turnips and artificial grasses, which only became common in the second half of the century, there was no adequate supply of winter feeding for cattle and horses, which were fed on straw and mashed whins. On this poor diet the farmer's stock was so emaciated that the cattle had to be carried (" lifted ") to the pasture in spring and fresh meat could not be had in winter. During this season only salt beef in the form of

1 " Insucken " denoted the grain liable to " thirlage "; " outsucken " that not so liable.

" the mairt " killed in the autumn was available for those who could afford this luxury. The supply of animal food was further limited by the ravages of foxes, which preyed on the flocks, though the hired fox hunter, with his pack of dogs, who was to be found in every district, or the less expensive method of trapping or poisoning, helped to some extent to counteract this pest. The food of the people was largely vegetarian, consisting of oatmeal porridge and cakes, pease bannocks, barley and kail broth. In some districts, however, salmon was so common during the season that servants stipulated that they should not be given it more than three times a week, and in the early part of the century it was sold at from 1d. to 2d. per pound. If simple, this diet was at least wholesome and free from modern adulteration. On this simple life large families were reared, though the lack of proper sanitation tended to breed disease and epidemics which thinned the population all too frequently. Unfortunately in virtue of the growth of population and the backward methods of cultivation, the land had ceased to produce sufficient food to feed the inhabitants. In many districts the lack of food was only too general, and in seasons of dearth it was disastrous.

The wages of farm labourers seem to have been very inadequate, though they began to rise from about the middle of the century. The rate varied with the district, but even in the more liberally paid districts and in cases where the wife might earn a few additional pounds by spinning and the children, if old enough, might also add to the scanty family income, a bare subsistence was usually all that was possible. Only by the most economic housekeeping and the simplest diet could the income be made to square with the expenditure.

In the second half of the century the agricultural depression began to give place to a marked improvement, due to the gradual removal of the defects and drawbacks which had hampered this primary industry. The general introduction of long leases gave the farmer a more secure tenure and an adequate return for his enterprise, whilst binding him to employ more serviceable methods of manuring and working the soil. Equally effective were the abolition of the runrig system, the introduction of a

fixed rotation of crops, the substitution of more fruitful seed for the grey oats and bere, the use of artificial grasses for pasture and hay, the enclosure of fields by dykes or hedges, the drainage of swampy ground, the use of lime in addition to farm manure, the invention and application of machinery and improved implements, the abolition of "thirlage" and services. The winnowing fan and the barley mill, which improved upon the old method of grinding barley by "knocking stones," had been introduced from Holland by James Meikle at Saltoun in 1710 and became common after the middle of the century. The swing plough, drawn by two horses, was invented by John Small of Dalkeith in 1750, and was a great advance on the ponderous and ineffective implement hitherto in use. The threshing machine was at last, in 1787, perfected by Andrew Meikle, son of James, and ere long displaced the flail, though this old-fashioned way of separating the corn from the straw prevailed in some districts far into the next century. Before the end of the eighteenth there were as many as 350 threshing machines in operation in East Lothian, with a marked saving from the new method in time and labour and in the quantity of grain threshed. The growing of potatoes and turnips in fields as well as in gardens, to which their cultivation had for long been confined, greatly increased the supply of food for man and beast. The cattle, which had starved through the winter on straw and mashed whins, grew fat on the more substantial keep provided by the hay and turnip fields, and salt beef ceased to be the only available commodity in the larder in winter. The reclaiming of bogs and moors brought more land under cultivation. The improvement of the roads in virtue of the Turnpike Act of 1751, which assessed proprietors and tenants for the upkeep of the highways, led to the use of improved vehicles and to increased and more rapid communication, and enabled the farmer to bring his produce more easily to market. The growth of trade and manufactures in the towns, which created a larger demand for food stuffs, also encouraged agricultural enterprise. The value of land rose in proportion, and the increased rents, which began to be paid exclusively in money, enabled the proprietor to spend much more in the improvement of his estate. Loans for this

purpose were more easily obtainable from the banks which were established in the county towns as well as in the larger cities. The Montgomery Act of 1770, so named from the Lord Advocate of the time, further enabled the proprietor of entailed estates to undertake improvements by placing on his successors part of the expense of enclosing, draining, and planting his land. Estates also came into the hands of those who had made fortunes in commerce at home and in the Plantations, and the business capacity and freedom from conservative ways of these new proprietors favoured agricultural development. The spirit of change was, however, sometimes more enthusiastic than practical and the experiment of adopting English methods in a country, whose climate was less propitious than that of the south of England, was not always a success. The new system of combining small into large farms involved hardship to the small tenants, who were compelled to become labourers, or drift into the towns, or emigrate to the Colonies. The policy adopted in the north of turning small holdings into sheep runs caused acute misery and led at times to violent resistance, with transportation as the penalty of the luckless resisters. The raising of rents by the proprietors in the Highlands was not justified by greater returns from the land. The tacksmen who became leaseholders also rack-rented their sub-tenants, the productivity of whose holdings was far more limited than in the south. There was, in consequence, destitution in many a Highland glen and this destitution was aggravated by the limitation of arable land, lack of employment and enterprise, over-population, the persistence of backward methods of cultivation, frequent failure of crops, vagrancy, wretched housing, and eviction of the small holder. For these evils emigration to the North American Colonies provided a harsh, though only a partial remedy.

In the south, on the other hand, the rise in rents was only an indication of the increased value of the land and the rising prosperity of the farmer. In Berwickshire, for instance, rents rose from between 1s. 6d and 8s. to 21s. an acre, in Perthshire from 5s. to 45s. in 1784, in the Carse of Gowrie from 6s 8d. to even £6. in 1783. Though a similar advance took place in all the Lowland counties, the farmer could become prosperous in

virtue of better cultivation, enlarged production, and higher prices, and in not a few cases could buy his farm even at the enhanced rates going. And not only the farmers, but their servants benefitted by this improvement. Though wages and conditions of life varied for the peasantry with the district, the general trend was an upward one. In the interval between the middle and the end of the century the wages of ploughmen and labourers had doubled, rising to an average of £14 or £15 for the former in the more developed regions, and from 6d. in summer and 5d. in winter to 1s. and 10d. a day for the latter. Better houses for the working class had also begun to displace the miserable hovels of an earlier time, and a notable improvement had also set in in dress and diet. It is not too much to say that before the end of the century the agricultural industry had been revolutionised, though the old conditions of tenure and the old methods of cultivation lingered in the Highlands and the remoter districts of even the Lowland counties. Whereas in the early part of the century the comparison between England and Scotland was all in favour of the former, by the end of it Scotland was beginning to redress the balance and was laying the solid foundation of that eminence in agriculture which in the following one was to reverse the comparison in its favour.

A striking result of this development was a marked change in the external aspect of the country by the planting of woods and forests. Woods were still nearly as rare in the Lowlands during the early part of the eighteenth century as in previous centuries. The improvement of the land and the landscape by plantations was at first the concern of only a few progressive proprietors like Lord Haddington, Cockburn of Ormiston, Lord Loudon, the Duchess of Gordon, and the Countess of Eglinton, and Dr Johnson could still in 1773 say with some truth, if far more exaggeration, that " a tree in Scotland is as rare as a horse in Venice." Trees might be seen around the mansions of the gentry, and hitherto unknown varieties like the larch, the silver fir, the walnut, the maple, the laburnum, the beech and chestnut were grown in sheltered gardens and carefully nursed on the assumption that they could not thrive in the open. Farmers opposed extensive planting on the plea that hedges and trees

spoiled the land and harboured the enemies of their crops. The prejudice against this improvement was long inveterate and showed itself in the destruction of plantations by the people overnight in spite of the old pains and penalties. This prejudice was all the more surprising inasmuch as the waste land was found admirably fitted to rear a great variety of trees, and the scarcity of wood, which had to be imported from Norway and the Baltic for building and other purposes, was a general grievance.

It was only in the second half of the century that this prejudice began to give way to more practical considerations and progress in afforestation immensely improved the monotonous aspect of the country, afforded shelter to growing crops, helped to drain the soil and temper the climate. Planting on a large scale became a sort of passion with both lords and lairds, and the forests of Nairnshire, Morayshire, Perthshire date from this period. The Duke of Atholl, for example, covered 16,000 acres with larch. Grant of Monymusk, Lord Findlater, Lord Murray and others planted spruce, beech, oak and elm by the million. To " be aye stickin' in a tree " was now an essential of rural economy. These plantations are sufficient to take the edge off Dr Johnson's sarcasm, though there were still treeless regions along his route and the improvement in the general aspect of the country, even where tree planting was in full swing, was not the work of a day. Gardening also profited from the general advance of the time, the earlier style of artificially ornamental trees and shrubs in the form of animals, copied from Holland, giving place later to a more natural arrangement. A variety of fruits and vegetables began to be cultivated and even the kail-yard of the cottar showed in this respect a marked improvement by the end of the century.

3. The Progress of Industry and Commerce

The Union was at first a dismal disappointment from the material point of view and the disappointment lasted till the fourth decade of the century. Scotland expected a burst of pros-

perity from freedom of trade with England and its colonies which did not come. Instead of it came increased taxation, with loss of her French trade and no appreciable expansion of trade with England and the colonies in return. The politicians who had carried the Union against bitter opposition seemed to have sold their country for a mess of pottage. The revenue did not by a long way balance the expenditure of Government. Customs and Excise produced very much less than before the Union and the decrease was greatly helped by the smuggling of wine, brandy, and tea. Coin was very scarce and paper money almost the only currency. Lack of capital, which the Union failed to produce, lamed every effort at economic development. Monopoly and privilege were still jealously guarded by the royal burghs against the non-royal, and the old narrow and selfish spirit still dominated the guilds, especially the merchant guilds in their attitude towards the craft guilds. The £2,000 annually granted for seven years by the terms of the Treaty of Union, for the purpose of developing manufactures and fisheries, were allowed to accumulate without practical application to this object. Internal trade was hampered by bad roads and primitive means of transport.

Even in the dreary years succeeding the Union there were, however, signs of the approach of the prosperity which it made possible. In 1727 Parliament appointed a Commission, subsequently known as the Board of Manufactures, to administer the fund for the encouragement of industry, particularly the linen industry, offered premiums for the cultivation of lint and hemp and prizes to housewives who made the best piece of linen cloth, and established spinning schools for teaching the children to spin. The effect of this legislation ere long appeared in a notable advance of the linen manufacture, for the improvement of which ten skilled Frenchmen with their families were brought from France and settled on what subsequently became known as Picardy Place, Edinburgh. The spinning and also the weaving of linen yarn were begun or developed all over the country, and this ancient industry entered on its career of growing prosperity throughout the rest of the century. Already in the first decade after the passing of the Act the number of yards of linen cloth

manufactured had risen from about two to over four and a half millions and the value from £103,000 to £185,000. Ten years later, in 1748, the figures were well on to seven and a half millions, valued at fully £424,000. Part of the credit of its further development was due to the British Linen Company, incorporated in 1746, which provided the manufacturers with capital and material and carried on an extensive linen trade until it restricted its business to that of banking, as the British Linen Company Bank.

Progress in the woollen industry, to which the Commissioners assigned a much smaller proportion of the available fund, was much less rapid. In 1733, while fairly thriving at Edinburgh, Kilmarnock, and Stirling, it was still in a backward state at places like Hawick and Galashiels, where it subsequently became the staple industry. English competition after the Union also tended to retard its progress. The fishing industry, to which the Commissioners gave substantial financial aid, was also but slowly developed. Compared with the previous century it had, in fact, greatly declined, and owing to this decline, partly due to the increase of the salt duties after the Union, which made fish curing unprofitable, the enterprising Dutch reaped by far the greater part of the harvest of Scottish waters. Despite the inducement of herring bounties and the institution of "The Society of Free British Fishery," from the middle of the century onwards progress was very slow, and, with the exception of Wick, was confined to the West Coast, where Campbelltown and Stornoway prospered into thriving centres of the industry.

Commerce, like industry, derived little immediate advantage from the Union. What the Union was capable of accomplishing in the way of commercial expansion is, however, shown by the rising prosperity of Glasgow and Greenock, which it favourably affected before its beneficial influence was felt in the general trade of the country. The Treaty threw open to the merchants on the Clyde the trade with the colonies, from which they had previously benefitted only by illicit trading in evasion of the Navigation Laws. Greenock had prepared the way for this

development by constructing a spacious harbour between 1707 and 1710, and in 1719 its first ship sailed for the West. A year earlier Glasgow, which had carried on what little oversea trade it possessed in vessels chartered from Whitehaven, had preceded it in the dispatch of its first vessel across the Atlantic. In less than twenty years the number of its ships had risen to sixty-seven. The establishment of the linen manufacture in 1725 added to the limited variety of exported goods, and the import of colonial products, especially tobacco, greatly increased its wealth in spite of the competition and hostility of western English ports. Glasgow ere long, in fact, ranked next to London as a centre of the tobacco trade.

In the second half of the century came at last the industrial and commercial expansion of which these beginnings were the modest anticipation. In 1772 there were two hundred and fifty-two lint mills in Scotland. Ten years later the linen manufacture was carried on in every county except Peebles and Clackmannan. Forfarshire led by a long way; Fife, Perth, Renfrew, and Lanark coming next, the total number of yards for the whole country being nearly fifteen and a half millions, valued at £775,000. In 1798 the number of yards had swelled to about twenty-one and a quarter millions, with a value of £850,000. In certain parts of the country, however, the industry had declined before the end of the century. In the northern counties, for instance, at Edinburgh, long famous for its damasks, which in quality and price stood very high, and at Glasgow where, by the end of it, the cotton manufacture had largely displaced that of linen. The tendency was ultimately in the following century towards the concentration of the industry in the counties of Fife, Perth, and Forfar, where the introduction of improved machinery and steam propulsion enormously increased the output. The making of linen thread was also prosecuted at various places, such as Inverness, Banff, Aberdeen, and especially at Paisley, where it was introduced in 1725 from Holland, and became, and has ever since remained, a distinctive industry. The process of bleaching was improved by Dr Horne by the application of a mixture of water and sulphuric acid. Chlorine, which was applied by the French chemist Berthollet in 1785, was introduced

at Aberdeen in 1787. About ten years later chloride of lime was substituted by Mr Tennant of Glasgow.

In 1733 Patrick Lindsay, Lord Provost of Edinburgh, had emphasised in his book *The Interest of Scotland Considered* the deficiencies that hampered the woollen industry. Forty-three years later Mr Lock in his " Essays on Trade " was able to chronicle considerable progress in the spinning and weaving of woollen yarn which was carried on at Edinburgh, Dalkeith, Musselburgh, Tranent, Haddington, Dunbar, Linton, Linlithgow, Galashiels, Hawick, Melrose, Kelso, Jedburgh, Peebles, Selkirk, Moffat, Dumfries, Sanquhar, Ayr, Kilmarnock, Glasgow, Stirling, Alloa, Perth, Montrose, Aberdeen, Peterhead, Elgin, Inverness. Weaving was also carried on in every village from the yarn spun in the homes of the people. Besides cloth, blankets, carpets, stockings, and flannels were manufactured. In the making of carpets Kilmarnock ultimately took the lead, the value of its production being estimated at £21,000 in 1791. Aberdeenshire was preeminent in the stocking industry, which represented an annual value of £120,000, until it was displaced by Hawick, where the stocking frame was first introduced in 1771, and other southern towns The application of improved machinery in the carding, spinning, and weaving of wool, as in the case of the linen manufacture, greatly increased production, though the full effect of this departure was felt only in the next century. Whilst the invention of this machinery was first brought into exercise in connection with the cotton industry in England, it was easily adapted to the manufacture of woollen and linen stuffs. Hargreaves' invention of the spinning jenny in 1767, which worked several spindles at once, multiplied the number of cotton threads spun at the same time by a single spinner. His invention was improved by Arkwright and Compton (the spinning frame and the spinning mule) during the next dozen years. Arkwright also produced an improved carding machine, and soon after (1785) Cartwright invented the power loom to take the place of the handloom, which similarly facilitated the weaving of the thread into cotton cloth. These improvements had to run the gauntlet of popular prejudice and ill-will which found expression in riots in Lancashire. Increased

production by machinery was regarded as tending to lessen employment and lower wages, and time was needed to show that the improving and cheapening of manufacture would inevitably increase the demand for the goods manufactured and thus increase the number of hands employed. Some years later (1794) Mr Bell of Glasgow also constructed a machine to supersede the hand loom, which was improved by Mr Miller of the same city, and was brought into practical use in 1810 in a factory at Pollockshaws. The application of steam and water power to the driving of this machinery further prepared the way for the textile development of the next century.

The cotton industry, which these inventions were devised to improve, was introduced into Scotland in 1778 by an English company, which built a small cotton mill at Rothesay. Ten years later about a score, driven by water power, had been established, eight of them in Lanarkshire and Renfrewshire, three in Perthshire, and two in Midlothian, and a number of factories were set up on the Solway in the south-west, which were, however, shortlived. Lanarkshire ere long took the lead, that at New Lanark being founded by David Dale, whose manager and son-in-law, Robert Owen, was not only one of the pioneers of the cotton industry, but a social reformer who evinced a rare practical interest in the workpeople and made New Lanark a model village. Glasgow and the Clyde district became the centre of the industry. Calico garments ere long vied with woollen, and the expanding trade in cotton goods was favoured by the heavy duties imposed on Indian calicos and muslins and by an abundant supply of all too cheap labour.

Relative progress is observable in a number of other industries. At Edinburgh and Glasgow the tanning and manufacture of leather were carried on, and Edinburgh in particular became famous for its production of leather goods. It supplied the army with large quantities of boots during and after the American War as well as maintained a large export trade with the West Indies. Snuff boxes, writing cases, drinking mugs, etc., were made of this material which, in virtue of a special process, acquired the appearance of tortoise shell and made it capable of a high polish. Edinburgh also took the lead in coach-

building, whose development was due to John Horne, who in 1738 went to London to perfect his knowledge of the trade and, on his return, introduced new tools and trained a number of workmen to become experts in constructing the various parts of a coach. The result was a rapid development of the industry and a large export trade to the Continent. Paper making also found its chief seat in the Edinburgh district, the oldest mill being at Valleyfield, Penicuick, which was started in 1709. Whilst in 1763 there were only three mills in the district, which produced 6400 reams annually, the number had grown to twelve ten years later, with a production of 100,000 reams. Printing advanced with the advance in paper making from four printing offices in Edinburgh about the middle of the century to twenty-seven in 1779. Glasgow, however, surpassed Edinburgh in the excellence if not the quantity of its printed books, and the brothers Foulis of that city brought out between 1744 and 1770 a series of classical works whose typography challenges comparison with that of any other country. Newspaper enterprise had also started on its prosperous career in Edinburgh and Glasgow and in some other towns. *The Glasgow Journal*, which flourished for over a century, dates from 1729. *The Glasgow Herald* was begun in 1783, though it then, and for twenty years after, bore the name of *The Advertiser; The Glasgow Courier* in 1791. The establishment of *The Edinburgh Advertiser* in 1764 was due to the enterprise first of Alexander Donaldson, and afterwards his son, James Donaldson, who made a large fortune as printer and publisher, which he bequeathed for the endowment of Donaldson's Hospital. *The Edinburgh Gazette* was begun in 1699, though the official publication under this name was not started till near the close of the eighteenth century. *The Evening Courant*, which survived till 1886, followed in 1718; *The Caledonian Mercury*, incorporated in 1867 with *The Scotsman*, two years later; *The Edinburgh Weekly Journal* in 1744; and *The Aberdeen Journal*, which still survives, in 1748. Other provincial papers established within the century were *The Kelso Mail* (1797), and *The Greenock Advertiser* (1799). *The Scots Magazine* first appeared in 1739, to be followed by *The Weekly Magazine*, started by Walter Ruddiman at Edinburgh in 1768.

Leith and, later, Edinburgh led the way in the manufacture of glass; Glasgow, where the first pottery was founded in 1748, in that of earthenware; Greenock in sugar refining, though it was anticipated by Edinburgh and Leith in attempts, which were not very successful, to develop this industry. Edinburgh further gained supremacy in the brewing industry in spite of the malt tax which was extended to Scotland in 1725, and produced a serious riot at Glasgow, whilst the distilling of whisky, licit and illicit, was supreme in the Highlands and its consumption, which was favoured by smuggling, gained materially in the course of the century on that of beer. Edinburgh also maintained the preeminence in the making of plate and jewellery which it had inherited from an earlier time, of which the Hospital endowed by George Heriot, the enterprising goldsmith of James VI, who left part of his large fortune for this purpose, is the fitting memorial.

Coal had long been used as fuel on a limited scale in Scotland. As early as the twelfth century power was granted to the monks of Holyrood to work coal in the lands of Carriden, near Bo'ness, and in the beginning of the thirteenth the coal in the estate of Tranent was made over by charter to the monks of Newbattle. At the end of it that on the estate of Pittencrief was granted to the monks of Dunfermline. It seems to have been used largely in connection with salt works, but the growing scarcity of wood led to its more general use and by the end of the sixteenth century it was burned in hall and kitchen as well as forge. Its value as fuel had become so generally recognised that Acts were passed in this century by the Scottish Parliament prohibiting its export. In the seventeenth century an export duty was substituted for this prohibition.

At first the supply seems to have been obtained from the outcroppings of seams on river banks or in valleys. Later a primitive form of mining was adopted by driving tunnels into the seams. This method was superseded by the more effective one of sinking shafts from the surface down to the seams and raising the coal and pumping out the water by various contrivances. For this purpose a steam engine was first applied in Scotland in 1762. Means were devised for ventilating the workings as the

shafts were deepened, and the expedient consisted at first of causing a rush of air from the surface down the shaft by means of a furnace at the mouth of the workings. Under these conditions the life of the miner was a most laborious and dangerous one and the labour was intolerable and demoralising in the case in which women and children were employed to carry the coal from the workings to the surface. His lot was aggravated by an old law of 1606 which made him in many mines virtually a serf, and which was extended in 1661 to all other colliery workers. He was " thirled " for life to the mine in which he worked and sold along with the land to the proprietor who bought it. If he ran away or entered the service of another mine owner, he was liable to be punished as a thief who had " stolen " himself and his service from his master. To assist detection a collar was rivetted on his neck with the name of the owner on it. The same restriction applied to the workers in salt pans. In return the master was bound to maintain his serfs in sickness and old age and provide for their burial. Their wages were relatively high compared with those of the free miners—2s. 6d. a day in 1763, or about three times that of a day labourer of the same period. Their existence and that of their women and children was, however, little above that of the brutes and there certainly was ample reason for the passing, in 1775, of the Act which abolished such servile conditions for those who after this date should " begin to work as colliers and salters," and emancipated those under a given age who were already engaged in these occupations. The act was not inspired by humanitarian motives, but by the necessity of attracting more workers to the developing industry, and it was not till 1799 that an additional act absolutely abolished the baneful system.

Progress in the mining, smelting, and manufacture of iron ore is connected with the establishment of the Carron Iron Works in 1760. The smelting of iron ore was an ancient Scottish industry, as the remains of the numerous bloomeries show. These were mostly situated in the Highlands where the necessary wood for making the charcoal used in the process was obtainable. The ore was transported to these forests for the reason that it was more compact and portable than the timber. The

establishment of the Carron Works led to a great change both in the method and the locality of the iron industry. Their founder was Dr Roebuck who was born at Sheffield in 1718, had studied medicine at Edinburgh University, practised as a physician at Birmingham, ultimately devoted himself to chemistry, and established a manufactory of sulphuric acid at Prestonpans. He then turned his attention to the smelting of iron ore and found on the Carron, near Falkirk, a spot well suited by the combination in the district of ironstone, coal, and water power for the realisation of his plan of establishing an iron foundry. He found that coal in the form of coke could be used more effectively in smelting than charcoal, and from the English engineer Smeaton he obtained valuable assistance in the provision of more powerful blast cylinders, which the substitution of coke for charcoal in the furnaces rendered necessary. These blowing engines were worked by means of water wheels, but the extension of the works rendered the supply of water inadequate. To make good this defect James Watt erected a steam engine for pumping the water back into a reservoir and thus procuring the additional power. The works ordinarily employed about 1000, besides miners and other workmen, and the iron produced was wrought into cannon cast solid and bored by drills not only for the British, but every European Government, pipes, cylinders, sugar boilers, anchors, stoves, and grates. The variety of ore used was the "clayband," the superior "blackband" not being discovered till the beginning of the next century. The construction of the Forth and Clyde Canal from Grangemouth to Bowling, near Glasgow, begun in 1768, and completed in 1790, greatly aided the development of the foundry, which by the end of the century had become the largest in Europe. New furnaces were erected in the shires of Lanark, Ayr, and Fife, and in 1796 the number had risen to seventeen, producing 18,640 tons of pig-iron annually.

Industrial expansion by encouraging home and foreign trade had a marked effect on the increase of shipbuilding on the Clyde and in some of the eastern ports. Leith, which had only 2,285 tons of shipping in 1744, had increased its tonnage to 18,000 in 1792, which was engaged mainly in the Baltic trade. In 1779

it launched its first ship of war for the Navy—the *Fury* of 16 guns—since, it is said, the reign of James VI. The shipping of the Fife ports, long decadent, revived in the second half of the century and at the end of it Dysart and Kirkcaldy had each 4000 tons. By this time Grangemouth was a busy port with a large coasting and Baltic trade. About twenty-five ships belonged to its neighbour Bo'ness, while there was some shipbuilding at Kincardine-on-Forth. Further north Dundee, Montrose, and Aberdeen were also becoming thriving ports, the tonnage belonging to Aberdeen being in 1800 23,236, that of Dundee 8,741, of Montrose 6,555. Whilst Glasgow had only 5,600 tons in 1735, it was credited with fully ten times this number in 1771—an evident exaggeration. By the deepening of the Clyde by means of dredging, which was carried out by the engineer Golborne and completed in 1773, vessels drawing not more than from 7 to 8 feet of water were enabled to reach the Broomielaw. But the larger vessels discharged at Port-Glasgow, which belonged to the Glasgow Corporation, and an extensive traffic was carried on between it and the Broomielaw by a fleet of flat-bottomed boats called garbarts, which gave employment to a large number of bargemen. The lead in shipbuilding and in the number of its registered ships was held by Greenock, which in 1800 possessed 35,057 tons. Shipbuilding was also carried on at Ayr, and Irvine had 5,783 tons of shipping. The total for the whole country shows a substantial increase during the second half of the century, though the increase seems to have fluctuated according as the country was at peace or war. In 1763 it owned 1,062 vessels of about 60,000 tons, in 1770 1,509 with a tonnage of 88,849. In 1792 it had risen to 2,143 with a total tonnage of 162,274, manned by 13,491 seamen. There was a decline till the end of the century, due apparently to the war with France, the figures in 1799 being 2,031 with a tonnage of 148,110.

The increase in shipping was paralleled by the increase in imports and exports. In 1760 the imports were valued at £850,792, the exports at £1,086,205. In 1774, before the outbreak of the American War, they had increased by £202,276 and £372,142 respectively. There was a falling off in the trade with

America during the war and in 1782 the balance of import over export was against Scotland to the extent of fully £155,000. But in 1800 the imports had more than doubled the figures reached in 1774 and the exports were close on 2½ millions, the balance being well in favour of Scotland. The excise revenue of £30,000 in 1707 had swelled in 1797 to £1,293,084.

In addition to the business capacity and energy of merchants and manufacturers, finance played an important part in developing the rising prosperity of the country. The three principal banks that had been established in Edinburgh before the middle of the century—the Bank of Scotland, the Royal Bank, and the British Linen Company—and banking firms such as Coutts & Co., extended their activity to the provincial towns. Others such as the Perth Banking Company, the Glasgow Arms Bank, and the Ayr Bank, were founded in these towns, in spite of the efforts of the older companies to crush them. Banking, which had long been pursued by merchants as part of their miscellaneous business, became a separate profession, and the indiscriminate issue of paper money to make good the lack of bullion was decisively checked by Act of Parliament in 1765 in the interest of an improved and reliable currency.

4. The Growth of Towns

The industrial and commercial progress of Scotland is also apparent in the expansion of its towns and the growth of population. In the early years of the century Edinburgh, including Leith, which since the Reformation had been a dependency of the Capital, had a population of 30,000. In 1760 Macpherson records it at double the number. At the close of the century it had swelled to over 80,000. Before the middle of the century a beginning in town extension had been made by the erection of two streets—New Street and St John Street—off the north and south sides of the Canongate respectively. In 1763 the North Loch was drained and the North Bridge completed in 1772, three years after the collapse of the south end of it owing to the scamped work of the engineer, W. Mylne, and the lack of

proper supervision on the part of the Town Council. Further west a huge mound had been constructed across the valley some years earlier. In 1788 the Register House was finished and before the end of the century the magnificent New Town had taken shape as far west as Castle Street, the plan of this northern extension being prepared by James Craig, a nephew of the poet Thomson. A beginning of expansion on the south side had also been made by the construction of the South Bridge over the Cowgate and the building of George Square. Town extension was a much-needed boon in a city like Edinburgh which, owing to its situation on a ridge between two ravines and its lack of cleanliness, was long a cramped and unsavoury place to live in. The migration which began in the second half of the century to the New Town was the beginning of a much belated change for the better. Previous to this period the quaint, homely life of an earlier time had changed little. Even lords and lairds, judges, professors, lawyers, ministers, and physicians lived in scanty flats up the dark, dirty stairs of its closes and wynds, as well as in its spacious High Street and Canongate. For business as well as for drinking, which was an essential of many a transaction, numerous taverns were available. A regular practice was to repair thither several times a day, and for this dubious practice bad and insufficient housing was probably largely responsible. Drinking bouts, with their multifarious toasts and sentiments, were also an obligation of private hospitality throughout the greater part of the century, though conviviality was happily becoming more self-respecting towards the end of it. Life and character might become less original owing to such changes, but the loss was counterbalanced by the gain in refinement and propriety.

At the time of the Union Glasgow was a pretty town of 12,500 inhabitants. In 1760 Macpherson describes it as " a beautiful and increasing city " with 26, or 27,000. Three years later the number was 28,300 and in 1801 its population of 77,385 nearly equalled that of Edinburgh. Its commerce had suffered a temporary eclipse during the American War. For this check its merchants speedily found a remedy in the extension of the trade with the Continent and the West Indies. The deepening

of the Clyde and the completion of the Forth and Clyde Canal contributed materially to its recovery. In the year in which the war ended it established a Chamber of Commerce for the promotion of trade and manufactures. Here is the picture of its surging industry and commerce sketched by Macpherson in 1800. "Before America became independent of Great Britain, the foreign commerce of Glasgow was chiefly with that country; and consequently it was deranged by that event. But the enterprising spirit of the merchants has found new channels of commerce, sufficient to employ their capitals and industry. They have also turned their attention more than formerly to manufactures, whereby the city has become the centre and fostering parent of a prodigious number of manufacturing establishments. There are thirty printfields within the influence of this hive of industry. The towns and villages in a circuit of many miles around, and some at considerable distances, are filled with spinners, weavers, and the many other classes of work-people, depending upon the fabrics of the loom and the stocking frame; and there are in the neighbourhood several ironworks for making cannon and all other articles of cast iron, which, taken collectively, are perhaps scarcely inferior in importance to the Carron Works. The works for window glass, bottle glass, and ornamental glass are extensive and thriving. Sugar baking, malting, and brewing are old established concerns. But it would be almost as difficult to particularise all the manufactures of Glasgow as those of London, and it may suffice to say that manufactures of almost every kind are carried on with spirit and activity, and generally in joint stocks by companies, or, as they are generally called here, *concerns*, under the management of one or more of the partners; and that the manufactures requiring fire have the vast advantage of coals close to the city."

Glasgow's neighbour, Paisley, had a population of only about 4,000 in the middle of the century. In 1792 it had reached 14,000 and a large part of the town had been rebuilt within the previous half-dozen years. In the same interval that of Dundee, which had suffered direly at the hands of General Monk in the seventeenth century and had only slowly recovered, had increased

from 12,000 to 20,000, of Perth from 9,000 to about the same total, of Aberdeen from 15,000 to 24,000. Over the whole country the population had risen from over a million at the beginning of the century to 1½ millions in 1797, and in 1801 by fully an additional 100,000.

5. James Watt and the Steam Engine

Part of this prosperity was made possible by James Watt, the improver of the steam engine. Watt, who was born in 1736, early showed a capacity for mechanics. This capacity he inherited from his grandfather who had migrated from Aberdeenshire to Crawfordsdyke, near Greenock, where he taught mathematics and navigation, became bailie of the place, and latterly a prosperous merchant of Greenock. His father, who combined the occupations of shipwright, shipchandler, builder, and general merchant, was also a man of ability and took an active part, as member of the Town Council and Treasurer, in the affairs of the burgh. His mother, Agnes Muirhead, is described as "a gentlewoman of good understanding and superior endowments." Their son, James, was a delicate boy and received a good deal of his education from his parents. He was a precocious pupil with a taste for mathematics, and very dexterous in the use of the tools with which his father presented him. "Jamie has a fortune at his finger ends" was a saying among his father's workmen. He had the observant, enquiring mind that loves to make experiments and get at the secret of things, as the story of the tea kettle shows. Before he was 15 he had twice read Gravesande's Latin Manual on Physics and interested himself in electricity and chemistry. In 1754, at the age of 18, his father, having been overtaken by misfortune in business, sent him to Glasgow to learn the art of mathematical instrument maker. Whilst working for a time with a mechanic who repaired spectacles and fiddles and made fishing tackle, etc., he attracted the notice of Dr Dick, the Professor of Natural Philosophy, who advised him to proceed to London for further instruction in his chosen craft and gave him a letter of introduction to a friend. Through this friend he found in Mr Morgan,

mathematical instrument maker, a master willing to give him a year's instruction for £20. Fortified with this increased practical knowledge, he was back in Glasgow in 1758, bringing with him new tools and material wherewith to make others and hoping to start a business of his own. The Guild of Hammermen, in which a mathematical instrument maker was required to enrol, required, however, an apprenticeship of seven years in the burgh and without this qualification he could not be admitted. Happily his friends in the University, Adam Smith and Joseph Black among them, came to the rescue and not only employed him as instrument maker within its precincts, where the laws of the Guild did not prevail, but allowed him a room where he could exhibit his instruments for sale. There was, however, little demand for his quadrants and other products and he was fain to make or mend a variety of articles such as fiddles and flutes, spectacles and fishing tackle in order to subsist. Black gave him an order for an organ and though he knew nothing about organs and had no ear for music, he had an extraordinary aptitude for learning how to make things, and made up for the defect by studying the laws of harmony. The organ was, therefore, forthcoming in due course and was a remarkable success.

In the winter of 1763-64 he turned his attention to the application of steam as a motive force. He began by experimenting with Newcomen's engine, a model of which was in the University. The steam generated in the boiler only produced a few strokes in the piston which works the engine, and the engine stopped. More steam was generated, and the engine would not work at all. The piston in the cylinder in Newcomen's engine was forced up by the steam and thrust down by the pressure of the air on the open top of the cylinder. But the condensing of the steam cooled the cylinder and thus interfered with the steady working of the piston. How to remedy this defect, produced by condensation within the cylinder, was the problem. In seeking a solution Watt began by investigating the properties or nature of steam. He realised that invention depends on the grip of scientific principles—the study of the facts or phenomena of nature, apart from any practical application of them, as the

true way of arriving at this application. Moreover, he possessed in an eminent degree the faculty of mastering every phase of a subject which excited his interest and engaged his attention—the true test of success in any department of work. As the result of his investigation, he discovered the fact of latent heat in water transformed into steam, which, unknown to him, had already been discovered by Dr Black. He found that one pound of steam blown into cold water heats it six times more than one pound of boiling water poured into the cold water does. This higher rate is the amount of latent heat in the steam. He further found that the total amount of heat in the steam remains the same whatever the pressure, but that 4/5ths of it was lost in heating the cold cylinder and that only 1/5th acted on the piston. The problem now was to get the total heat of the steam to act on the piston so as to increase its power fourfold. For this purpose the cylinder in which the piston works had to be as hot as the steam, and to secure this the steam had to be carried off into a separate condenser instead of being left to condense within the cylinder and thereby cool it. This was the truth that flashed on his mind as he walked one Sunday afternoon, early in 1765, on Glasgow Green. To maintain the cylinder at the required temperature he encased it, leaving a space, between it and the case, filled with steam. The cylinder he used for this purpose was a brass syringe connected with a tin can, which served as a condenser, into which the steam rushed after driving up the piston, which was thrust down by the air pressure into the vacuum thus created, and driven up again by a new blast of steam into the cylinder, and so on as long as the steam was applied. The experiment made with this primitive contrivance was a triumphant demonstration of the idea that had flashed on his mind on that fateful Sunday afternoon.

This experiment he toiled to bring to practical fruition in the model engine which he constructed in an old cellar in the city. The difficulties in the way of success were increased by the lack of skilled workmen in the making of the parts and their consequent imperfections. The result was that it "snifted at many openings," or joints, and would not work smoothly. A second and larger one, begun in a more commodious workshop, was a

great improvement on the first, though it also, on being set to work, revealed many defects of workmanship. These defects were, however, only mechanical; the principle of the separate condenser was absolutely correct. Want of funds was another difficulty, for the invention could not be perfected without money and the patent which he desired to take out was an expensive matter. The Government of the day certainly did not show an enlightened interest in scientific invention, or any adequate sense of its practical value. He had, besides, to work for his living and do surveying in connection with the canal schemes of the period, and this made heavy inroads on the valuable time which should have been given to the work of perfecting the engine. Dr Roebuck helped and Dr Black also. At last in 1768 he succeeded in constructing a model which worked smoothly. In August of that year he went to London to secure the patent and after distracting delays finally, on January 5, 1769, obtained it.

Success was, however, still mitigated by failures. An engine, constructed on the successful model, to work Dr Roebuck's coal pits at Bo'ness, showed many defects owing to the imperfect workmanship of the mechanics—so great is the distance between a successful model and a successful working engine. Worse still, Dr Roebuck got into financial difficulties over his pits and Dr Black had to come to the rescue to pay for the patent. Happily a new friend and co-operator came on the scene in Matthew Boulton of Birmingham. In 1775 began the memorable partnership in the manufacture of engines, though lack of trained mechanics was still a serious drawback. Orders came from mine-owners for engines to pump their mines. But there were financial anxieties not a few to overcloud the expansion of the new enterprise, to which Boulton contributed his rare business ability and Watt his still rarer inventive genius. The development of the engine by a series of further experiments increased the demand for it by enabling it to be used for a great variety of practical work. This development consisted in adapting it to produce a rotatory motion and thus turn the wheels of all kinds of mills and machines, in the use of steam on the expansive principle, in the double acting engine by which steam, instead

of the air, as in Newcomen's engine, was used to press the piston downwards as well as upwards, in the composite engine in which the same steam worked the piston of a second cylinder and thus doubled the power. These and other improvements were covered by the patents of 1781, 1782, and 1784, and at last, in the second half of the twenty-five years of co-operation of the two partners, prosperity dawned. Both retired in 1800, leaving the management of the firm to their sons, and Watt was enabled to enjoy the fruits of his strenuous career in a happy old age " when he enjoyed life as he had never done in his youth." He lived nearly twenty years after his retirement, dying at Heathfield in Staffordshire in 1819, after he had seen the application of the steam engine in the steamship and the railway locomotive.

In 1787 Mr James Taylor suggested to Mr Millar of Dalswinton, to whose sons he was tutor, the idea of applying the steam engine to propel ships. Mr Millar caught at the idea as a solution of the problem of propelling ships by mechanical contrivance, to which he had for some time been directing his attention. To this end he had made use of a paddle wheel fitted between two boats and turnd by the hand. By this device he had succeeded in propelling a double boat at a speed of several miles an hour on a trial trip made from Leith. Taylor suggested to him that steam should be applied as a substitute for manual power in order to obviate the severe labour required to move the paddles. He found in William Symington an engineer capable of carrying out his idea. Symington constructed an engine to be used for driving the paddles and the experiment took place in Dalswinton Loch in the summer of 1788. The engine mounted by him on the deck of the double boat propelled the paddle wheels, placed in the space between the two boats, at the rate of five miles an hour. The experiment was a success, but nothing further was done to develop it until 1801, when Symington succeeded in interesting Lord Dundas, one of the directors of the Forth and Clyde Canal, in the enterprise. Taking advantage of Watt's improvements, he constructed an engine which propelled a paddle boat, the *Charlotte Dundas*, on the Canal at a speed of between six and seven miles an hour. The boat was

used to tow barges on the Canal and was the first steam propelled vessel to be put to practical use. Unfortunately the directors of the Canal, fearing lest the action of the waves caused by the paddles should damage the canal banks, decided to discontinue its use, and Symington, the inventor of the first practical steam boat, having failed to obtain an annual pension from the Government, died in poverty.

6. Social Conditions

Social conditions underwent a gradual change in keeping with the economic advance characteristic of the second half of the century. During the first half of it manners and customs still differed little from those prevailing in the previous century. In the country houses of lords and lairds, ladies in middle age wore the carefully handled dresses which had been part of their marriage outfit. Whilst these lords and lairds had little money to dispose of, there was plenty of substantial food on their tables, in virtue of the payment of rent in poultry and other kinds of produce. The standard of comfort was still, however, rather primitive even in the houses of the country gentry. The beds usually stood in inlets in the walls, with sliding doors, and the windows of the rooms were without sashes. Food was eaten from wooden or pewter plates. Glasses were scarce, if bottles and casks were numerous, and in many households the ale or wine was drunk from the same glass, which went the round of the table. Knives and forks were not too plentiful and it was not considered boorish to pick the bones and make use of the knife to convey food to the mouth. Tea drinking was creeping in and became common in great houses towards the end of the first quarter of the century, in spite of the protests of old-fashioned people against " the vile drug." Men of rank kept a lumbering coach, imported from Holland and drawn by six horses, to convey them when on a journey over the deeply rutted roads, with two footmen standing behind armed with long poles to prise it out of the ruts, and one to go in front to give warning of any obstruction. Lairds went on horseback with their ladies behind

them, and one of their labouring men on another horse to attend them. Both wore homespun made of the yarn which the members of the household spun on the rock and reel, and later the spinning wheel, and woven by the village "wabster," except on special occasions when gayer garments were donned. The plaid was an indispensable part of feminine clothing for gentle and simple, though it differed in quality according to rank. English broadcloth and foreign fashions were, however, like tea, beginning to appear from about the first quarter of the century. The younger generation was learning these fashions in the capital, or in Holland and France, whither the sons of nobles and gentry went to study law or medicine.

Despite these greatly deplored innovations, fashion changed slowly, and in Edinburgh in 1720 there was only one milliner. In the country the travelling tailor and weaver long sufficed for the simple needs of the country housewives of the upper class. Family life in these homes, under the Calvinist régime, was of the Spartan type, parents being regarded by their children not only with reverence, but with awe, the rigid intercourse between them allowing no scope for familiarity or endearment. Sunday must have been for the young a fearful and tiresome day, being devoted to religious exercises, private as well as public, from morning to night, including attendance twice at long and heavy services in the kirk. Whilst there was much intercourse and mutual hospitality among the gentry of a parish or district, it was conditioned by the political passions and prejudices of the day. Whig and Jacobite assorted little together, the Stuart loyalty of the latter being obnoxious to the former, while the Jacobite hated with a perfect hatred the Hanoverian allegiance and the Presbyterian strictness of his Whig neighbour. In those days of limited incomes and large families it was not deemed a humiliation to apprentice younger sons to shopkeepers in training for the vocation of "merchant," who was a retailer of a miscellany of articles ranging from candles and tobacco to lace, wine, and pearls. Many of these Edinburgh "merchants" were the brothers of lairds, baronets, and even lords. In the Highlands, where prejudice and pride were strong, a gentleman, whilst despising shopkeeping, might be found keeping an inn, or

plying the trade of a cattle dealer and selling to English graziers the black cattle which he drove down from the hills and glens to Crieff market or tryst.

The lack of communication tended to prolong this old world social life. In 1740 Lord Lovat took eleven days to travel in his chariot from Inverness to Edinburgh, with numerous mishaps to the vehicle by the way. In 1749 a stage coach began to run between Edinburgh and Glasgow twice a week at a fare of 9s. 6d. and performed the journey of 46 miles in twelve hours—a great improvement on previous times, when a coach and six horses required a day and a half. By the middle of the century carriers were only beginning to carry goods between the towns, in place of cadgers with their creels on horseback. Even as late as 1770 a carrier took a fortnight for the journey from Edinburgh to Selkirk and back with a load of six hundredweight. Up to 1754 there was only a monthly stage coach between Edinburgh and London, which did the journey in from twelve to sixteen days, letters being carried by the post in six days. From Edinburgh to the larger towns as far north as Inverness and Thurso letters were at first carried by foot postmen, till the horse-post gradually introduced a quicker mode of transport. The primitive character of Scottish roads, which underwent no improvement till the second half of the century, certainly offered little inducement to travel.

From about 1760 the old ways underwent a marked transformation. New mansion houses, better furnishings, a more varied diet, and more sumptuous fashions came in. Better roads led to better vehicles and more rapid communication, and this of itself always brings with it social change. Instead of one stage coach a month from Edinburgh to London, there were now two daily, which reached the Capital in 60 hours. Glasgow ultimately came into direct communication with London, the journey lasting five hours longer. By the end of the century the journey between it and Edinburgh was reduced to six hours. Postal communication and inns were also greatly improved. The improvement in agriculture and trade brought increasing wealth—another unfailing innovator of old habits and customs in the style of living. The Statistical Account of Scotland,

written between 1790 and 1797, and throwing a flood of light on the social condition of the people, is full of complaints of what the writers, who were usually the parish ministers, deem the extravagant addiction of their parishioners to new fashions in dress and unwonted luxuries. The round hat has replaced the Kilmarnock bonnet as the headdress for men on Sundays and market days, English broadcloth the old homespun. Their women folks despise the coarse stuffs of less pretentious times for silks and cotton. Formerly a watch and a clock were rarities in the parish. Now every farmer has an eight-day clock and nearly every farm servant a watch. The use of whisky and tea for ale and beer has spread like a plague over the land, and the widespread practice of tea drinking comes in for more severe censure than even the immoderate use of whisky. Fifty years ago a tea kettle was usually only to be found in the laird's mansion or the minister's manse : now the tea kettle is in evidence in nearly every cottage and is almost invariably regarded by the writers as a most ominous sign of the degeneration of the times. The growing use of tobacco among both men and women is equally dangerous to both health and morals. The increase in the consumption of tea is all the more surprising in view of the price, which was 4s. per lb., whilst the pound of sugar sold at 11¼d. Wages had begun to rise and with this rise the price of food had also risen during these fifty years. A pound of beef or mutton, which cost 1d. or 1½d. per pound about the middle of the century, cost 5½d. or 6d. towards the end of it. Similarly the price of a dozen of eggs had risen from 1d. to 4d. or 6d., a fowl with a dozen of eggs from 4d. to between 1s. 4d. and 1s. 9d., a pair of geese from 2s. to 5s. 6d., a turkey from 3s. to 7s., a pair of pigeons from 1½d. to 6d., fourteen haddocks from 1½d. to 1s. 6d., and a bottle of claret from 1s. to 6s. Another indication of what even these censorious writers regard as an improvement was the general use of forks and knives at table, which had previously been unknown among the country people at least. The diet of the farming class, if not so generally that of their servants, showed a corresponding advance in the greater use of meat. The housing of the working class was also beginning to show a relative improvement in the better cultivated districts at least.

The fishing population—a numerous body in the east coast towns and villages—constituted a class by itself. The women took an active part in their husbands' labour, gathering bait, baiting the lines, carrying the fish in creels, containing perhaps a hundredweight, to their customers or to the market, often a long distance off; carrying, too, their husbands on their backs through the shallow water, even in the coldest weather, to their boats in places where there was no pier, in order "to keep their men's feet dry." Withal a hardy race to whom Dr Carlyle, in his account of Inveresk, and other writers devote a well merited meed of admiration.

The people led laborious lives and seem to have taken life rather seriously. Holidays were few, recreation and festivity limited. Hallowe'en and Beltane (1st May) were celebrated by the lighting of bonfires, with the quaint practices, reminiscent of pagan times, so racily depicted by Burns in the case of the former. Yule and New Year were feast days in the material sense, and the occasion of shooting matches, football, and other diversions. On Shrove Tuesday the boys indulged in cock-fighting, the dues going to the schoolmaster as part of the perquisites of his office. Curling was the favourite winter game in the south. Archery still had its devotees, and there was golf on the links at Musselburgh, Leith, St Andrews, and Montrose. The tendency by the end of the century was towards increased social intercourse among neighbours and friends by the giving of dinners and suppers. The reaping of the last sheaf, called the maiden, was celebrated in some parishes by bringing it home to the music of bagpipes or fiddles and spending the evening in dancing and merriment, the girl whose fortunate lot it was to gather it acting as queen of the feast. Another old time occasion of festivity was "the daubing," when the neighbours assembled to assist in building the mud walls of a new farmhouse, and after the operations, were regaled with meat and drink, the feast finishing with a dance. Marriages and even funerals were also the occasions of festivity and were associated with many popular superstitions. Certain days and months—Friday and the months of January and May—were regarded as unlucky for marrying. Some would only marry when the moon

was waxing and the tide flowing. The day once fixed for the ceremony must, if at all possible, be observed for fear of the evil consequences that were supposed to follow a change of date. Marriage being "a tying of the knot," all knots in the apparel of bride and bridegroom were loosed before the ceremony and tied again after it. A common feature was the penny wedding, the company present providing by its contributions the feast, which lasted for a couple of days and was usually the occasion of much rough merriment and excess. It was customary to invite the whole parish to a funeral, the beadle going round to proclaim the death and the invitation, and preceding the coffin ringing his bell on the way to the graveyard. Wakes or watching the corpse by the neighbours before burial were held, and the spirit of the departed was assumed to remain near the body till it was committed to the grave and to keep watch at the churchyard gate, till relieved by that of the next person who was buried. The day of the funeral was practically a holiday, for the whole of the inhabitants of a parish were invited to attend and refreshed themselves only too well before and after the obsequies. The funeral, in fact, seems to have often ended in a carouse. "From the death to the interment," notes one writer, whose account seems to be generally applicable, "the house is thronged by night and day and the conversation is often very unsuitable to the occasion. The whole parish is invited at 10 o'clock in the forenoon of the day of the funeral, but it is soon enough to attend at 3 o'clock afternoon. Every one is entertained with a variety of meats and drinks. Not a few return to the dirge (potation after the funeral) and sometimes forget what they have been doing and where they are." Happily he adds that in his own day (at the close of the century) these excesses were passing away.

Superstition was not confined to marriages and funerals. The belief in fairies, ghosts, and witches was still common, especially in the north. Ghosts of course appeared to the benighted wanderer in lonely places. Similarly the less fearsome fairies were to be seen in their green apparel and beaming faces, and one previously sceptical clergyman returning from a Presbytery dinner was fain to confess that he had been seized by them and

carried in the air to his own door! What were accounted supernatural sounds were heard at night about the farm steading and regularly repeated, it might be, for weeks and months on end, until some old man, who possessed the art of conjuring the evil thing, was sent for to exercise his skill on the haunted spot. No fisherman would dream of going to sea on certain days or turn his boat against the sun's course, and generally the lucky way in performing many actions was that from east to west. Second sight and the evil eye were articles of faith, incantations and charms as a protection from "scaith" or evil still common. Other devices, such as drawing imaginary circles, placing knives in the walls of houses, or branches of mountain ash above the stalls of the cattle also served to frustrate the ill intentions of the evil spirits. Lakes, wells, and rivers had their genii who could heal diseases and foretell events to those who sought their haunts and made them a present of some small object. Saints' or holy wells, such as St Columba's or St Fillan's well, were invested with the same virtue, the saint receiving for his kind offices in healing disease a variety of offerings such as pins, needles, bits of clothing, etc.

7. Education and Culture

The establishment of the Presbyterian Church of Scotland at the Revolution placed the schools under the supervision of the Presbytery within whose bounds they were situated. All schoolmasters were required to sign the Confession of Faith as a condition of holding their office, and in 1706 the ministers were enjoined by the General Assembly to visit and examine all public schools within their Presbyteries at least twice a year. This ecclesiastical supervision obtained throughout the century, though there were occasional attempts on the part of schoolmasters to evade the obligation to sign the Confession and of Town Councils to dispute the right of visitation by Presbyteries of the burgh schools without their concurrence. The tendency towards the end of it was to question and curtail the jurisdiction of the Presbyteries to the extent of allowing an

appeal to the civil courts against their decisions. Their zeal was, however, not confined to keeping an alert eye on the religious views of the schoolmaster and on the instruction of their pupils in the Catechism. They strove with laudable perseverance to bring into operation the law of 1696 directing the establishment of a school in every parish, which heritors were only too ready to neglect. Their efforts were not very successful and a large proportion of the population in many Lowland parishes could not read or write. The state of education was far worse in the Highlands, though the Society for the Propagation of Christian Knowledge strove to provide at least religious instruction in the remoter districts, and the church had established 109 parish schools in the Highlands by the year 1732. Distance from the school was one of the difficulties in educating the dwellers of the Highland glens, and even at the end of the century a very large percentage of the people were still illiterate. Hence the old custom in both Highlands and Lowlands of reading the Psalms to be sung line by line in order that the people might join in the singing. Though illiterate the people in the Lowlands were not so ignorant as one might infer from the imperfections of elementary education. They learned a great deal from the services which it was obligatory to attend and were well drilled in the Catechism by the ministers who held regular visitations for catechising their flock. Their knowledge at least of divinity of the old fashioned orthodox type was by no means contemptible, and many who could neither read nor write could, in their own narrow fashion, expatiate with no mean force on the fundamentals.

On the whole, however, popular education throughout the century was at a low level. The schoolmasters were miserably paid, the school was often but a wretched hovel which also served as the poor master's dwelling. Many of them lived their strenuous lives on the verge of starvation owing to the niggardliness of Town Councils and heritors, whose sense of the value of education, measured by the means they provided to maintain it, was lamentably deficient. It is strange to read that the pittance allowed the schoolmaster as salary was eked out, not only by small quarterly fees, but from the proceeds of

cock-fighting on Fastern's E'en, when the boys brought their cocks to the schoolroom, paid the master a trifle for the right to pit them against each other, and in addition left the dead birds as a perquisite of his office. Nevertheless in not a few of these schools sterling work was done in return for this pitiful remuneration. From many of them " the lad of pairts " made his way to the University and some to distinction in the professions. Some of these schoolmasters themselves, like Thomas Ruddiman, attained to distinction in learning and literature. Very noteworthy is the democratic spirit which embraced the children of all classes in a common instruction, the son of the laird sitting beside the son of the farmer and the cottar on the same bench.

The first quarter of the century is rather a dreary period in the history of the Scottish Universities. The higher education had suffered from the political and ecclesiastical turmoil of the previous century. The system in vogue by which the " regent " or professor taught to his students all the subjects necessary to a degree was not favourable to distinction or even proficiency in any one subject on the part of the professor. This objectionable system was discarded at Edinburgh in 1708, at Glasgow in 1727. At St Andrews it lingered till near the middle of the century and at King's College, Aberdeen, till the end of it. The instruction was given in Latin, in which the student had been well drilled in the Grammar Schools, and it was only in the second quarter of the century that English began to take its place as the medium of lecturing. The students who could afford it lived in rooms within the colleges where a strict discipline, aggravated by exacting religious exercises, prevailed, with the result that outside residence was greatly preferred. The supervision, especially on Sunday, when they had to go twice to church, and were examined afterwards on their knowledge of the sermon and dared not go out for recreation, was indeed a burden grievous to be borne. Most of them were as a rule lads of from 13 to 15 and careful supervision was advisable in view of their extreme youth. Excessive regulation was, however, bad educationally and in the second half of the century, under the humanising influence of moderatism, it was going out of fashion.

Philosophy and physics were obligatory for a degree in Arts and they were still taught in the old scholastic fashion in the early part of the century. Gradually, however, as the " regenting " system disappeared, more competent teachers and new methods of teaching brought a new life into the class rooms and raised the Universities out of the rut of mediocrity. A number of chairs in law and medicine, which had hitherto been studied in Holland or France by the more reputable practitioners, were founded, and the number of students at Edinburgh and Glasgow was more than doubled during the second half of the century, Edinburgh having 1,600 in 1800 and Glasgow 800 in 1792. At Edinburgh the stately building designed by Adam was begun in 1789 to replace the humbler tenement of an earlier time. This new life may be said to date from the advent of the mathematician Colin McLaurin—a worthy successor of the three Gregorys —at Edinburgh in 1735, and of the philosopher Francis Hutcheson at Glasgow in 1730. Hutcheson's lectures on Philosophy, which were delivered in English, " constituted," says his recent biographer, Professor Scott, " a revolution in academic teaching." He discarded the old text books and the old scholastic method and gave his students the benefit of his own inspiring thought. Among those who conferred distinction on themselves and the Universities as scholars or men of science were Principal Robertson, Adam Ferguson, Adam Smith, Thomas Reid, Dugald Stewart, John Robison, Joseph Black, the three Munros, John and James Gregory, William Cullen, Hugh Blair, and Robert Simson. It would be easy to enlarge the list by including many names of men of varying degree of eminence in order to emphasise the great advance made since the seventeenth century by the Universities as centres of a vigorous intellectual life. This advance is in truth as remarkable as that observable in the industrial sphere. The intellectual and moral energy, which had expended itself in the political and ecclesiastical struggles of the preceding century, now found scope in literary and scientific pursuits and completely redeemed Scotland from the general intellectual mediocrity of that century.

Not only within, but outside the Universities there was a notable rise in culture. In the society of the Capital and the

University towns the leaven of an active intellectual life was at work throughout the latter half of the century. The literati of Edinburgh, and Glasgow, and Aberdeen could compare favourably with those of London or any other European capital, and the reputation and influence of some of them were not confined to this side of the Border or even of the Channel. The Scottish intellect in the eighteenth century earned the enthusiastic appreciation of Mr Buckle who, after emptying the vials of his wrath and also of his prejudice on the heads of the Scottish divines of the seventeenth, had only admiration for " the eminent and enterprising thinkers (of the eighteenth) whose genius lighted up every department of knowledge and whose minds, fresh and vigorous as the morning, opened for themselves a new career, and secured for themselves a high place in the annals of European intellect." Hume influenced in a powerful degree the thought of the Continent as well as of his native land, though he failed to obtain the chair of Moral Philosophy at Edinburgh. Adam Smith may be said to have created the science of Political Economy, Hutton that of Geology. Besides these there was a large number of highly cultured men in the professions—lawyers like Monboddo, Kames, and Henry Erskine; and ministers like John Erskine, Alexander Webster, Robert Wallace, and Jupiter Carlyle. Literature in the stricter sense found in Allan Ramsay and Robert Fergusson precursors of Robert Burns, the peerless lyric poet, in whose muse vernacular Scottish poetry attained its perfection and its climax. His songs alone would have made him immortal. Remarkable is the bevy of ladies who also excelled, on a limited scale, as song writers. Mrs Cockburn, Miss Elliot, Joanna Baillie, Lady Anne Lindsay, Lady Nairne gave voice alike to the pathos and the humour of Scottish life, high and humble, in such gems as " Auld Robin Gray," " The Flowers of the Forest," " The Land o' the Leal," " The Auld Hoose," and " The Laird o' Cockpen." Jacobitism redeemed its exaggerated king-worship by the touching devotion of such outpourings of its loyalty as " Flora MacDonald's Lament." The romantic note also found expression in James Macpherson's Fingal and Temora, which professed to discover to a responsive age the authentic remains of the

ancient Gaelic muse. These Ossianic poems were largely the composition of their would-be discoverer, whilst embodying genuine fragments of traditional poetry and reflecting with considerable success the mystic Celtic spirit. But they caught on in spite of hostile critics like Dr Johnson, who was stoutly opposed by Dr Blair, and they gave a powerful impulse to the Romantic movement in European literature. Music, both vocal and instrumental, had many amateur devotees in Edinburgh, who performed at the concerts given in St Cecilia's Hall in the Cowgate, and in 1764 a playhouse was licensed in the Capital where the citizens might gratify their taste for the drama without fear of the law and the outcry of the Kirk against such a satanic innovation. Allan Ramsay, bookseller as well as poet and wigmaker, did much for the wider diffusion of culture by starting a circulating library in 1726, which provided, in spite of the ecclesiastical censor, the latest literature from London. Even among the country people the old taste for edifying works of divinity was beginning to relax and in place of Peden's *Prophecies*, or Rutherford's *Letters*, or Boston's *Fourfold State*, the coarse popular chap books of a Dugal Graham were being read at many a cottage fireside. Hundreds of thousands of these popular books were being sold about 1770, though, unfortunately, the widespread demand by no means denoted a growing refinement of popular taste.

In philosophy, political science, and literature, in particular, Scotland in the second half of the eighteenth century contributed what may fairly be termed an epoch-making quota to the intellectual life of the age. In respect of its quality and its influence, the achievement of Hume, Adam Smith, and Burns in their respective spheres takes a place of the first rank in the history of European culture. From 1739, when he published his *Treatise of Human Nature*, till his death in 1776, Hume steadily added to his reputation as a thinker by a series of philosophical works, including the *Philosophical Essays Concerning Human Understanding*, the *Enquiry Concerning the Principles of Morals*, and the *Natural History of Religion*, besides his *History of England* and a series of Essays on Politics and Ethics. In his recent book on *English Philosophers and*

Schools of Philosophy Professor Seth pronounces him "the greatest English philosopher," though his system of thought has bred many critics and antagonists. He was what is termed an empiricist in philosophy. In other words, he not only based all knowledge on experience, but held that the mind itself is "but a bundle of different conceptions." His system accordingly tends to scepticism, to shake belief in the identity, the reality of the perceiving self, apart from its perceptions, and, when applied to revealed religion, to strike at the foundations of received beliefs. But it was acutely and powerfully reasoned and exercised a decisive influence by quickening the thought of men like Reid, and especially Kant and Hegel, who elaborated their antagonistic systems under his stimulating influence. In this respect his influence on the development of modern thought was far-reaching.

The germ of Adam Smith's epoch-making work as an economist is to be found in the lectures on *Justice and Police*, which he delivered whilst Professor of Moral Philosophy at Glasgow University, and which were only lately discovered and published. These lectures afford convincing proof that he had thought out the main principles of his more mature work on *The Wealth of Nations* independently of the French writers from whom he was long believed to have borrowed them. They were delivered long before he had met Quesnay and Turgot in France. It was, however, during a two years' sojourn in France in 1765-66, where he took the opportunity of discussing economic problems with these distinguished economists, that he began to write the *Enquiry into the Nature and Causes of the Wealth of Nations*, which he gave to the world in 1776. In it he sought to undermine the Mercantile or Protective system which was then and had long been in vogue, and to demonstrate that freedom of trade and industry was the true way to develop both. Under the Mercantile system the chief object of the State was conceived to be the maintenance of its power for defence and offence against other States which were regarded as its rivals for power. Hence the necessity of amassing treasure which provides the sinews of war, of restricting by navigation laws its trade to its own shipping, which provides a strong navy, of fostering popula-

tion which provides a strong army. The idea was that, in order to maintain itself against its rivals and grow wealthy and powerful, it must protect itself by restriction of trade and industry in its own interest. The principle, in common language, was to better yourself by beggaring your neighbour, since the gain of other nations is so much loss to one's own. In place of this system Smith advocated one based on freedom of trade. National wealth, he contends, does not consist in the amount of national treasure, but in productive labour. An indispensable condition of production is liberty, " leaving every man free, as long as he does not violate the laws of justice, to pursue his own interest in his own way." The exercise of this liberty benefits industry by giving scope for man's labour. Therefore all the artificial restrictions of industry in the form of protective devices (close corporations or guilds, bounties, monopolies) in vogue under the Mercantile system are injurious to industry by hampering production. Equally beneficial is the exercise of liberty in the domain of commerce, whether internal or foreign. Whatever tends to favour the free exchange of commodities only benefits the people. In the domain of foreign commerce in particular, the less restriction the better. The idea that wealth consists in treasure and that, therefore, a nation must export more than it imports in order to have a favourable balance in money as the result of its trade is false. If foreign trade increases production it increases wealth apart altogether from a favourable money balance. But it will not increase production if a nation acts on the principle of trying to keep down the commerce and industry of other nations on the assumption of a mistaken self interest. Self interest will really derive more advantage from the prosperity of these nations, because their prosperity will increase their power of buying from others what they do not produce. Therefore the less restriction, the greater freedom, the better. Mutual self interest consists in making international trade as free and consequently as active as possible. The work was a direct challenge to prevailing economic opinion and practice. But it made a powerful impression on the economic thought of the time and exercised a marked influence on the fiscal policy of the country, as is shown by the commercial

treaty in a free trade direction concluded by Pitt with France in 1786. Some of its contentions and conclusions have been challenged and improved on by later economic writers like Bastiat. There came in the second half of the nineteenth century a strong reaction against the competitive spirit in industry, which his system tended to foster, in the direction of subordinating the interest of the individual to that of the community in the social and economic sphere. But in the main its practical influence has lasted. The work was, in fact, not a mere chain of reasoning on economic principles. This reasoning was enriched and strengthened by the historic data on which its author liberally drew to illustrate and enforce it. And it not only developed and advocated a new theory. It sought both to show a better way of increasing national prosperity and with it the material welfare of the people and to attain a better international system, based on the mutual interest of the nations.

The muse of Robert Burns whose short, if meteoric career as poet began in 1786, when he ventured to publish a first collection of poems, seldom goes far afield, though it ere long carried his fame the wide world over. It is concerned largely with himself, with the scenery amid which he lived, the people among whom he dwelt. His poetry is the man as he toiled, and loved, and suffered; caroused, and erred, and repented; dreamed, and aspired, and pitied. It is instinct with life in all its phases—grave and gay, tragic and comic, high and low, good and bad, as the poet experienced and saw it. Just because he was so alive himself, he has a keen eye for the unreal—for pretension, hypocrisy, quackery, and cant—and withers it in the cutting blast of his satire. Witness "Death and Dr Hornbook." He cannot refrain from exercising it even on the Kirk and its narrow Calvinist creed, as in "Holy Willie's Prayer," "The Holy Fair," "The Kirk's Alarm," and "The Twa Herds." Of course he exaggerates the failings of ministers and creeds, as satire, to be effective, must do, and his own failings were certainly fitted to draw on him the attention of the censor in the pulpit. Nevertheless there was material enough for the satirist to work on in the formalism and hypocrisy in which conventional religion was too apt to deck

itself, and the satirist's blast did good in helping to clear the religious atmosphere of his time. It ought to be remembered, too, that, with all his failings, the satirist was a deeply religious man, as " The Cottar's Saturday Night " and many other pieces, as well as his deliberate statements on the subject in his letters to Mr Cunningham and Mrs McLehose, prove. As a moralist he was, at his best, superlative, and no better advice on the right conduct of life could be given to the young than " The Epistle to a Young Friend." Such utterances are the best antidotes to the unfortunate tendency, which he shared with his age, to glorify the drinking habit, of which he finally became the tragic victim. Conviviality, coupled with sobriety, was not the fashion in those days, and Burns' influence undoubtedly helped to prolong the fashion, to the ruin of many besides himself. Even here the moralist does not fail to utter a warning note on occasion out of his own sad experience. Of the humour of which the Scottish tongue and the Scottish temperament are capable, he is the peerless medium in rhyme at least. What more inimitable than " Tam o' Shanter " and the " Address to the Deil "? And who has pictured the social customs and joys of the people, as in " Hallowe'en," with such spirit and masterly simplicity? Peerless, too, are the songs in which he celebrates the passion which he could not always control, but to which he gave the sweetest and finest expression in such lyrics as " My Nannie's Awa," " Green grow the Rashes," " Corn Rigs are Bonnie," " Afton Water," and many more. Pity that these and other lyric gems of the Scottish muse are so little appreciated by our boys and girls, our young men and maidens, who all too generally prefer the rubbish of the music hall to the treasures of the bards of former days, even of the chief of them.

8. Religious Life

The change from Episcopacy to Presbyterianism at the Revolution left much bitter feeling in the south-west and in the region north of the Tay, where the Episcopalians were very strong. This feeling survived till well into the first half of the eighteenth

century, when a new generation of clergy had taken possession of the parishes and the old animosities begotten of the persecution of the Presbyterians by the Episcopalians before, and of the Episcopalians by the Presbyterians after, the Revolution died down, and were only revived for a brief period by the excitement of the Forty-Five. Their place was taken by the outbreak of ecclesiastical contention within the Church, which caused no little ferment among the people, in certain districts at least, and resulted in a series of small schisms. Religion entered deeply into the life of the people. There were long services on Sunday, which it was obligatory to attend, and on at least one week day, whilst the minister carried the instruction of the pulpit to the homes of his parishioners by systematic visitation and examination in the Cathechism and the Scriptures. The churches in which they worshipped were often mean and miserable hovels, ill-lighted, ill-ventilated, and for long unheated and unseated, which the parsimonious heritors neglected to keep in repair. "Dark, damp, dirty hovels" is the description which the minister of Glenorchy applies to many of them even at the end of the eighteenth century.

The great "occasion" of the year in the religious life was the celebration of the Communion, when the people flocked from the neighbouring parishes to the parish church in which the Sacrament was to be held. The services extended over several days in addition to Sunday. Popular ministers drew great crowds, and in "The Holy Fair" Burns has rather irreverently given a vivid description of the scene. It was no easy matter to provide food and shelter for such a concourse, and the attraction consisted for many in such excitement and good cheer as were to be had. These assemblies were for the preachers with a popular gift regular field days. The church or the tent was crowded to overflowing during their long harangues, whilst the man who had no unction or little action had the mortification to find that the ale barrels and the bread and cheese outside had more attraction for the crowd than his unsensational oratory. Though these celebrations were the nurse of genuine religious feeling, Burns hardly exaggerates the right human failings which he hits off, and the change to a more decorous order of things which, under the

influence of Moderatism, took place during the century, was certainly a change for the better.

The century witnessed a gradual change in religious use and wont. In some respects it was a change for the better, though it greatly distressed the minds of the old-fashioned who strove to keep alive the religious fashions and forms of an older time. The stern Calvinism in creed and life was losing its hold on the educated classes. Superstitions like witchcraft and ghost appearances were becoming relics of past beliefs. Ministers who had in their Arts course attended the lectures of professors like Hutcheson and Adam Smith, Adam Fergusson and Thomas Reid were better educated and more liberal and sensible, and this clerical type gradually displaced the narrow remnant of Covenanting days. The name attached to this more liberal thinking section—the Moderates—is significant of the broader spirit in the Church, which presents such a contrast to that of the previous century. Even the party which in theology championed the old doctrines and was known as the Evangelicals shed the extreme narrowness of former days. The Moderate influence is apparent in the relaxation of ecclesiastical discipline with its obtrusive and tyrannical methods. It was losing its harsher features when Burns arose to satirise it and the theological narrowness with which it was associated. The reaction to which he gave such telling expression had many representatives among the more cultured clergy. Religion became more human; the Sabbath less of a tyranny and a terror. It gained in charity what it lost in fervour and severity. A remarkable evidence of the growth of this more tolerant spirit is afforded by the change of attitude towards the drama and the playhouse. In the middle of the century the theatre was still under the ban of the Kirk, and great was the scandal when John Home, minister of Athelstaneford, ventured in 1756 to produce his tragedy of *Douglas*—which the philosopher Hume too fondly judged superior to Shakespeare—in Edinburgh, and even ministers like Jupiter Carlyle dared to witness. The Edinburgh Presbytery sounded a warning note against these " dangerous entertainments " and " such seminaries of vice and folly," and to escape deposition Home was fain to resign his charge, whilst

Jupiter Carlyle manfully faced the " libel " of the Presbytery of Dalkeith. The Presbyteries fulminated in vain against this scandalous and illegal conduct, and in 1764 Edinburgh at last got its licensed theatre. Towards the end of the century it was no longer a crime for even ministers to be seen at the playhouse, and when Mrs Siddons came to Edinburgh the General Assembly was half deserted by its members. Dancing assemblies also became fashionable in spite of pulpit denunciations, and music, both vocal and instrumental, had many amateur devotees in Edinburgh, who performed at the concerts given in St Cecilia's Hall in the Cowgate.

On the other hand, the preaching of the Moderates, as represented by the affected and formal oratory of a Blair, failed to make the pulpit the potent force in popular life that it had been in less enlightened, but far more explosive days, when religion was a real, if to some extent a misdirected power in both public and private life. From this point of view there was force in the reproach of the Evangelical party that Moderatism with its commonsense morality (" legalism ") was tending to deaden the spiritual life based on the more experimental apprehension of the Gospel. Certain it is that, if the services became more decorous and refined, the churches were far less crowded than formerly. Moderatism by its insistence on the legal rights of patrons in the face of popular opposition to unwelcome presentees tended, too, to alienate the democratic spirit that was still a power in the religious, if not in the political sphere in Scotland. Whilst comparatively liberal in thought, it was strongly conservative and reactionary in ecclesiastical politics and ranged itself on the side of " law and order." Hence the secessions which, under the Erskines, took place in 1733 (the Associate Presbytery) and under Gillespie in 1761 (the Relief Presbytery). The former represented the old narrow spirit which had lingered in its purity among the Cameronians, the direct descendants of the Covenanters, who had refused to acknowledge an uncovenanted Revolution settlement. In 1747 they took to quarrelling among themselves over the question of taking the oath, imposed on citizens taking office in certain towns after the Forty-Five, to defend " the true religion presently professed," and went asunder into

Burghers and Anti-Burghers. The Burghers further divided into " Auld Lichts " and " New Lichts " over the question of maintaining the Solemn League and Covenant, according as they affirmed or denied its continued obligation. The old religious temper, which laid such stress on the minutiæ of ecclesiastical beliefs, thus continued to colour the social life of the people despite the growing tendency to relegate them to the realm of things indifferent.

9. The Rise of Scottish Art

Scottish painting has little to its credit before the eighteenth century. The Reformation period made havoc of the old art associated with the Roman Catholic Church, and the poverty and civil struggles of the country in the seventeenth were unfavourable to the rise of the new. This new art takes its beginning in the first half of this century with George Jamesone, who was born at Aberdeen towards the end of the sixteenth and became " apprentice " to his uncle, John Anderson, painter at Edinburgh, in 1612. There is ground for believing that he spent some time at Antwerp improving his art under Rubens, though definite proof is lacking. His style at all events reveals the Flemish influence. He certainly paid a visit to Italy in 1633 which, however, seems to have left little or no trace in his later work, which includes a number of portraits of notable persons of the time. Though in his later period between the Italian visit and his death in 1644 he worked too hastily to do full justice to his powers, " the general air of his finer pictures," in the judgment of Mr Caw, " is distinguished, the tone refined, the handling delicate and charming in its clear fluency of touch, and the simplicity of his motive reposeful and ever dignified."

Most of the work of John Michael Wright, who is said to have been a pupil of Jamesone, was done in England during the second half of the seventeenth century. John Scougal, on the other hand, remained at home and produced many portraits in his studio in the Advocates' Close in Edinburgh during his long

career, which closed in 1730. They are of unequal merit, but some of them, especially those of Lord Harcarse in the Parliament House, Lord Carrington at Dalmeny, Sir John Clerk of Penicuik and his lady, and the Countess of Lauderdale in Thirlestane Castle, are highly appraised by the critics. His contemporary, David Paton, is remembered for his miniatures in pencil, " of great rarity and remarkable beauty," a number of which are preserved at Hamilton Palace. Among the foreigners who found patrons in Scotland in the second half of the seventeenth century were the Fleming De Wett, and Sir John Medina. The former left a very questionable memorial of his productivity in the one hundred and ten imaginary portraits of Scottish kings from fabulous times to Charles II., which astonish the visitor to the gallery at Holyrood and which he undertook to supply for the sum of £240. A few painted from life, of which several survive at Glamis Castle, convey a more favourable impression of his craftmanship. Medina was equally productive, for, according to an old writer, " he filled the country with portraits " before his death in 1710. According to Vertue he brought with him a large number of ready-made figures minus the heads, and the heads he added from the actual sitters till the supply was exhausted. With some exceptions his works are not rated very highly by the critics. " Sir John's work," judges Mr McKay, " at its best far from robust, often descends to a feeble and vapid imitation of Lely." He had at least a phenomenal success, was the last to receive a Scottish knighthood before the Union, and left a considerable fortune to his son who followed his profession without reflecting any credit, in the artistic sense, on his father. This success evinces not so much a love of art on the part of his patrons as the desire to have their portraits done in accordance with the aristocratic fashion of the time.

An interest in art for its own sake in the early part of the eighteenth century is evidenced by the founding in 1729 of " the School of St Luke " at Edinburgh for the training of native artists, which unfortunately did not live long. Some years before its foundation William Aikman left Edinburgh for London. He had improved his art in Italy where he spent a number of

years before settling in Edinburgh in 1712. For the next dozen years he produced many portraits, including that of his cousin, Clerk of Penicuik, as a baron of Exchequer, and of Allan Ramsay, which are among the best samples of his art. "Aikman at his best," says Mr McKay, "was a capable craftsman, but in common with the painters of his time, he lacked the strength of character to substitute an outlook of his own for the conventions by which he was surrounded." Allan Ramsay, the son of the poet, received his first training in the St Luke School, which he continued at London and in Italy. For eighteen years after his return in 1738 he was a notable figure among the Edinburgh literati and was one of the founders of the Select Society, of which Hume, Adam Smith, and Robertson were members. In 1756 he removed to London and ultimately became painter to George III. He was a highly cultured man, with literary as well as artistic tastes, and had the rare distinction for a Scot of gaining the appreciation of Dr Johnson. He spoke many languages, moved in the highest social circles, and corresponded with Voltaire and Rousseau. His contemporaries, who were perhaps jealous of his social success, did not rate his work very highly. He produced much and left much to his assistants, and modern critics have a good deal to say of his defects. To Mr McKay he seems "a mediocre artist," though he had in him the makings of a really great one, which he neglected to develop. The charm which he could lend to some of his female portraits, especially those of his wife and Mrs Bruce of Arnot, and the virility of those of the Earl of Hoptoun, the third Duke of Argyll, and MacLeod of MacLeod tend, however, to raise him above mediocrity, and the critics are unanimous in their appreciation of the elegance of design which characterises his chalk sketches and studies.

Glasgow followed the example of Edinburgh in establishing a school of art, the initiation of which in 1753 was due to Robert Foulis, the publisher and printer, and his brother Andrew. For over twenty years Robert gave his time to the venture at the expense of his proper business. The University provided rooms for it. A collection of pictures, prints, and casts was brought together, and teachers of painting, engraving, and copper plate printing

were brought from the Continent. But it met with scant support and at his death in 1775 it had to be abandoned as a failure. More effective was the foundation of the school of design by the Board of Manufactures at Edinburgh. Of this school Alexander Runciman, who had been trained in the Glasgow Academy and under the Norries, painters and decorators in Edinburgh, and had sojourned for a time in Italy, became master in 1771. He brought from Italy an enthusiasm for historical painting and found a congenial task in depicting for Sir John Clerk scenes from Ossian on the ceiling of the drawing room at Penicuik House and from the life of St Margaret on the cupola of a staircase in the same building. Somewhat theatrical, these decorative scenes, which unfortunately were destroyed by a fire in 1899, were not without a certain imaginative grandeur and impressiveness. His younger brother John, who died before his gifts were fully developed, gave promise of greater mastery in the same dramatic genre in his treatment of Biblical subjects and in his King Lear. Another pupil of the Glasgow Academy, David Allan, Runciman's successor as master of the Edinburgh School, devoted himself after a long sojourn at Rome to the delineation of scenes from Scottish life, in this respect a precursor of David Wilkie. " Technically," judges Mr Caw, " his work shows little real accomplishment . . . yet his designs are interesting as studies of character and as representations of the customs and costumes of a bye-gone age, while their effect on Scottish painting was great." Alexander Naysmyth, who combined the professions of architect and mechanician with that of artist, was another pioneer in the domain of landscape, and is also remembered for his portrait of Burns and of the fair daughter of Lord Monboddo, " the heavenly Miss Burnet " of the poet's enthusiastic acclaim.

These two were the heralds of what was about to reveal itself in Raeburn, Wilkie, and others—an art that was specifically Scottish. From Jamesone onwards Scotland had produced a series of painters, but no school of painting. Their art was conventional rather than individual or national and was devoted almost exclusively to portraiture. For this lack two reasons may be adduced. " There was not," says Mr Caw, " a suffi-

ciently patriotic and national sentiment among those who could have patronised art, and, there being little opportunity for artistic training at home, artists, even if fashion had not prescribed Italy, had to study abroad, with the result that they returned with the ideas of the school in which they were trained. Almost without exception the artists named in this chapter studied in Italy, a number of them for many years, and as there was no tradition in Scotland, and the artists were too few in numbers to create an atmosphere, they remained bound to what they had been taught. But with increase in numbers and with a quickened feeling of nationality abroad, first one and then another found his way to more personal expression, and the last ten years of the century contained the germs of a distinctive art. Henry Raeburn had emerged into prominence and was producing some of the portraits on which his fame most securely rests, Alexander Naysmyth had abandoned portrait for landscape in 1793 and was instructing one or two of those who were to give it character and style; and David Allan had commenced to paint scenes of Scottish rural life as early as 1783. Thomson of Duddingston was born in 1778, William Allan in 1782, Wilkie in 1785, and Watson Gordon in 1788, and the appointment of John Graham (1754-1817) to the mastership of the Trustees' Academy in 1798 resulted in increased and better opportunities for artistic training at home. Before the century closed, art in Scotland had commenced to assume some national characteristics."

Towards the end of the century the change to a fuller, larger life, which found expression in the manifold activity of the nation, produced an environment more favourable to art. The spirit of enterprise and invention, the keener interest in nature, the larger culture and the possession of greater wealth, with the refinement which culture and wealth tend to foster, furnished this more favourable environment. The New Town of Edinburgh and the expansion of Glasgow and other cities were an indication of the new age that had been growing in the second half of the century out of the old. The work of Raeburn is a proof that art had begun to respond to a new inspiration in the domain of portraiture, and that of Wilkie

and Thomson of Duddingston was soon to reveal it in genre and landscape.

Henry Raeburn, born in 1756, and an orphan at six, was educated at Heriot's Hospital, and at fifteen became a goldsmith's apprentice. He attracted the notice of David Deuchar, an etcher and seal engraver, who gave him some lessons and introduced him to Martin, the artist, who had been a pupil and assistant of Allan Ramsay. His connection with Martin soon ended in friction, but his marriage in 1778 with one of his clients who was a lady of means enabled him to complete his self training by a sojourn at Rome from 1785 to 1787. His sojourn improved his technique without spoiling the individuality of his genius. On his return he established his studio in George Street —afterwards removed to York Place—and straightway commanded success, which continued unbroken till his death in 1823. The year before his death he was knighted by George IV. at Hopetoun House, and seven years earlier had been elected a member of the Royal Academy. He painted all the notables of his time and produced over 700 portraits. Among the more famous of them are those of Dr Spens in the Royal Archer uniform, MacDonell of Glengarry in full Highland costume, Sir John Sinclair in the striking garb of a Highland chief and a military officer combined, Henry Erskine, Mrs Scott Moncrieff, Mrs George Kinnear, and Mrs James Campbell. Remarkably free from convention, he gave to his portraits the stamp of actuality, putting in practice the advice of Byres never to paint an object without having it before him, and he had the supreme art of reflecting character in colour. "To recall the Raeburns you have seen," says Mr Caw, "is to recall not so much a gallery of pictures as a number of people you have met personally, and this is due, of course, to the consummate art with which the painter expressed his own impressions of actuality. And the effect is heightened by the unconscious air of his sitters, who seem unaware that they are being looked at. His portraits are splendidly convincing—they capture at the first glance; you feel that that must be the man."

10. Poor Relief and Crime

At the beginning of the century Scotland, according to Fletcher of Saltoun, swarmed with beggars. The circumstances of dearth and famine in which he wrote were exceptional. But owing to the depression of the first half of it the number was still comparatively large, for the professional beggar was a legacy of former times, despite the old laws against the "sturdy" race. In 1579 Parliament had authorised, though it did not make compulsory, an assessment for the poor in each parish. But the enactment remained practically a dead letter and by the year 1740 only eight parishes had taken advantage of it. The method in vogue was that of licensing so many indigent persons in each parish to beg within its bounds, beyond which they were not permitted to exercise their calling, and to grant relief from the church collections for this object. Relief was thus dependent on the charity of the people, which was dispensed either directly in kind, or indirectly in money, through the agency of the Kirk Session, which distributed the collections. "Distressed persons," such as cripples and other sufferers, who were popularly known as "objects," were carried in carts or barrows from house to house throughout the parish by the inmates who, after relieving their needs, expedited them in this fashion to their neighbours. The begging fraternity invariably turned up at marriages, funerals, and communions to get a share of the good things going. The collections as a rule were meagre, for the people, especially in the early part of the century, had little to spare in the form of dyots, bodles, groats, and bawbees of which the infinitesimal parts of the Scots shilling consisted, the shilling being only equal in value to the English penny, and the pound to 1s. 8d. sterling. Moreover, the poor box at the church door was the receptacle for the bad copper money in circulation which was refused at the shop or the market. When the box was opened it was often found to contain nearly as many bad coins as good, and Kirk Sessions were often at their wits' end to meet the demands made on them. The weekly dole was, therefore, small, but it at least offered no temptation, as did the

statutory relief in England, to live on the rates or undermine a healthy spirit of self respect and independence among the people, characteristic of Scots folk in the olden days.

The improvement in agriculture in the second half of the century, by providing more work and higher wages, ultimately tended to diminish pauperism in the rural districts, except in the Highlands. The progress of commerce and industry similarly affected the towns for the better. At the same time the change in economic conditions, by favouring the concentration of population in the large towns, to some of which the destitute from the Highlands drifted, tended to increase the number of the poor, without materially increasing the means of their relief from voluntary sources, and made the problem of pauperism a pressing one. Moreover, if wages rose, prices also rose and providence among the working class did not necessarily increase with them. This fact alone made the task of relieving the poor, who from various causes increase with the growth of population in cities, a difficult one. The civic authorities were thus compelled to face the question of compulsory assessment versus voluntary relief in towns like Edinburgh, Glasgow, and Paisley. There was a strong feeling against departing from the old method as tending to lower self respect and put a premium on poverty. The ministers were for long almost unanimously in favour of maintaining the old method of voluntary relief. They were, however, fain to confess the inadequacy of the church collections to cope with the task in many parishes. In the larger towns at all events it was becoming hopeless, and Glasgow, Paisley, and Edinburgh were compelled in the second half of the century to have recourse to the law of 1579 and make trial of compulsory assessment. By the year 1800 ninety-three parishes had adopted this expedient.

Witchcraft was still accounted a crime and punished as such till well into the century. The last victim of this horrible delusion was burned at Dornoch in 1727, but happily the abolition of the Act against witches in 1736 rendered a repetition of such an atrocity henceforth impossible, to the consternation of all believers in the "traffickers with Satan," including Mr W. Forbes, professor of law at Glasgow, who in 1733 still gravely

expatiated in his lectures and his *Institutes of Scots Law* on the evidence of this hellish agency. Child murder was a common crime in the first half of the century, due in part to the rigorous ecclesiastical discipline which subjected the mother of an illegitimate child to the obloquy of a public penance before the congregation. Executions from this cause were at all events common before the more humane influence of Moderatism relaxed the old censorship of ministers and Kirk sessions. The criminal law was, however, much less brutal than in England, where no fewer than 164 crimes involved the death penalty. Whilst murder, or arson, or robbery of a serious nature were punished by death, imprisonment or banishment from the burgh, with branding and a whipping into the bargain were as a rule the only punishment for ordinary theft. Notorious thieves of the vagabond type, known as "sorners" or "Egyptians" were liable to banishment from the realm, and if caught in the act were hanged. The hereditary jurisdictions which invested the greater barons with the power of holding criminal courts within their domains had become a grave abuse, though interested persons might still defend them. The juries in these courts being composed of the lord's dependents, their verdict was naturally such as the lord or his baron bailie chose to make it. The lord's hangman or dempster was much in evidence under this arbitrary régime, especially in the northern parts. Transportation, though illegal, was a common device, since it enabled the impecunious baron to turn the administration of justice to his profit by sending the accused to the plantations in return for a money payment by the agent of some planter, as an alternative to the death penalty. It was not till 1748, after the second Stuart rising, that this arbitrary and corrupt jurisdiction disappeared at a cost to the country of £152,000, or about one-fourth of what these greedy magnates demanded. The riddance of this oppressive system was well worth the money. Serious crime was, however, rare in Scotland and its punishment mild in comparison with England, and such practices as the public flogging of criminals, especially of women, ere long came to grate on the public taste and disappeared. The prisons or tolbooths were, however, no better than in the southern

country, and the lot of their inmates, of whom the majority were dishonest debtors, was found by John Howard towards the end of the century to be wretched in the extreme.

SOURCES:—Sinclair, *Old Statistical Account of Scotland* (1791-99); MacIntosh of Borlum, *Treatise Concerning the Manner of Fallowing the Ground* (1724); Burt, *Letters from a Gentleman in the North of Scotland* (1726), (edition 1815); Ramsay, *Scotland and Scotsmen in the Eighteenth Century*, edited by Allardyce (1888); Murray, *Life in Scotland a Hundred Years Ago* (1900); Dunbar, *Social Life in Former Days* (1865-66); MacPherson, *Annals of Commerce*, III and IV (1805); Knox, *View of the British Empire* (1785); Bremner, *The Industries of Scotland* (1869); MacKinnon, *The Union of England and Scotland* (2nd edition, 1907); Graham, *Social Life of Scotland in the Eighteenth Century* (1900); and *Scottish Men of Letters in the Eighteenth Century* (1901); Couper, *The Edinburgh Periodical Press* (1908); Grant, *History of the Newspaper Press*, III (1872); Norrie, *Edinburgh Newspapers Past and Present* (1891); Ferguson, *The Brothers Foulis and Early Glasgow Printing* (1889); Mathieson, *The Awakening of Scotland* (1910); Kerr, *History of Banking in Scotland* (2nd edition, 1902); Arnot, *History of Edinburgh* (1788); Gibson, *History of Glasgow* (1777); MacGeorge, *Old Glasgow* (1880); Marwick, *The River Clyde and the Clyde Burghs* (1909); Grant, *History of the Burgh Schools of Scotland* (1876); Strong, *History of Secondary Education* (1909); Gibson, *Education in Scotland* (1912); Muirhead, *Life of James Watt* (1858); Carnegie, *James Watt* (Famous Scots Series); Woodcroft, *Origin and Progress of Steam Navigation* (1848); Scott, *Francis Hutcheson* (1900); Knight, *Hume* (1886); Huxley, *Hume* (1879); Seth on *Hume* in *English Philosophers and Schools of Philosophy* (1912); Adam Smith, *The Wealth of Nations*, ed. by Nicholson (1884); Rae, *Life of Adam Smith* (1895); Hirst, *Adam Smith* (1904); Farrer, *Adam Smith* (1881); MacPherson, *Adam Smith* (Famous Scots Series); Currie, *Burns' Poems and Letters*; Blackie, *Life of Burns* (1888); Hepburn Miller, *Literary History of Scotland* (1903); Buckle, *History of Civilization*, III, (ed. 1885); A. Carlyle, *Autobiography* 1722-1805 (1860); Cunningham, *Church History of Scotland* (1882); McKay, *The Scottish School of Painting* (1906); Caw, *Scottish Painting Past and Present* (1908); Murray, *Robert and Andrew Foulis* (1913).

PART II

THE NINETEENTH AND EARLY TWENTIETH CENTURIES

1. General Features

The nineteenth century was a period of marked social and industrial progress in Scotland. The promise of the second half of the previous century was realised on a scale undreamt of at the dawn of its successor. In every sphere there is observable a stirring of new life as the innate energy of a sturdy race at last found adequate scope for its practical expression. Under the influence of the French Revolution the stagnation of Scottish political life was broken and the movement for political emancipation started on its progressive course, whose stages are marked by a series of political reforms which ultimately gave the franchise to the working class as well as the middle class, and finally secured at least the partial political emancipation of women. No less striking is the spirit of industrial and commercial enterprise which was the concomitant of the industrial revolution and which, though not without its drawbacks for the working class, not only vastly developed the national wealth, but greatly contributed to the material and social improvement of the people. In literature the first quarter of the new century gave birth to those masterpieces in fiction which portray with such dramatic power and such insight and sympathy the national life and history and created a world-wide interest in Scotland and its people. In education and science, in art and religion the new century had also a great mission to

fulfil and the record of its achievements in these spheres is also one of great things. It witnessed, in fact, the rise of a new Scotland in which the old would have no little difficulty in recognising itself.

2. The Progress of Agriculture

A great impulse was given to Scottish agriculture by the French Revolution war. In 1795 the price of wheat rose from 50s. to 81s. 6d. per quarter, and in the following year to 96s. In 1812 it attained the record of 126s. 6d. A large amount of waste land passed under cultivation, and the rapid progress between 1795 and 1815 is apparent from the fact that the rent derived from agricultural land in Scotland rose from 2 millions to $5\frac{1}{4}$ millions sterling during these twenty years.

Agriculture, like other industries, had, however, its ebbs and flows from the conclusion of the war in 1815 onwards. During the next ten years, for instance, there was a marked decline, due to trade depression, from the inflated prices of the previous years, and in 1822 the quarter of wheat had fallen to 44s. 7d. The Government might attempt by means of the Corn Law, limiting the importation of foreign corn, to maintain the price. But trade depression by limiting the capacity of the people to purchase food, tended to frustrate the effect of this protective measure. Then came another period of prosperity in consequence of the revival of trade which the close of the war had depressed. Another factor which materially affects the industry is the weather and thus, in spite of protection, bad trade and bad seasons periodically lessened the farmer's profits. The artificial stimulation of prices by the Corn Law was removed by its abolition in 1846 and agriculture had henceforth to depend on the law of supply and demand and the resource of the agriculturist. Moreover a prosperous period tended inevitably to bring about a rise in rents owing to competition in the letting of farms. During the thirty years following the middle of the century rents rose nearly fifty per cent., and when a series of bad harvests supervened, as in the years between 1872 and 1881, the resulting

loss and distress were little short of calamitous. The industry was also hampered by the laws relative to it, especially the law of Hypothec, which were conceived in the interest of the landlord rather than the tenant. On the whole, however, judging from the increasing acreage under cultivation, the industry made a substantial advance during the first three-quarters of the century. The number of acres of farmed land, including grasses under rotation and permanent pasture, rose, for instance between 1857, when statistics first became available, and 1877 from 3,556,572 to 4,668,221.

Despite this substantial advance, the landlord and tenant system, under which agriculture was largely prosecuted in Scotland, was far from satisfactory to the tenant. Apart from the disadvantageous effects of recurring trade depression and bad harvests, the conditions on which the land was held by the tenant were not fitted to encourage enterprise on the part of the farmer, or yield an adequate return for his capital and labour. Farmers are proverbial grumblers, but the grievances incident to the system sixty years ago were by no means merely querulous. So serious had the situation become in 1879—owing partly to a series of bad harvests, partly to the evils inherent in the current tenure of the land—that the Government was compelled to nominate a Royal Commission to enquire into the causes of the prevailing distress. In consequence of its report a beginning was made in the legislative removal of the farmers' grievances in the Agricultural Holdings Act of 1883, which was extended by those of 1900, 1908, and 1920. The Act of 1883 gave to the tenant at the expiry of his tenancy compensation for improvements made by him during it as far as these were not justly due to the inherent capabilities of the soil. The sum paid in compensation is defined as that which " fairly represents the value of the improvement to the incoming tenant." Hitherto all improvements made by the tenant accrued to the landlord at the termination of the tenancy. " If," writes Sir Isaac Connell, " the tenant by the use of expensive manures had brought up the land to a high state of fertility, if with or without the approval of his landlord he had spent money on additions to the buildings, or in drainage operations, it was quite open to the

landlord at the end of the lease to claim all the improvements as belonging to him, and in some cases the tenant had the option of quitting the farm and leaving behind him the capital so expended or of paying a rent increased to some extent in consequence of the very improvements which had been effected at his own cost. The Act of 1883 changed all this by providing that, subject to certain conditions, compensation should be paid to the tenant for such improvements." The Act further limited the right of Hypothec, which the landlord possessed under the amended Act of Sederunt, of summarily removing a tenant whose rent was in arrear for twelve or even six months. The amending Act of 1900 dealt mainly with the question of disputes over the amount of compensation and directs that in case of such disputes " the difference shall be settled by arbitration," and makes the award of the arbitrator final. The Agricultural Holdings Act of 1908 extended the compensation to the tenant in case of disturbance when compelled to quit his farm " without good and sufficient cause and for reasons inconsistent with good estate management." That of 1920 is intended to ensure security of tenure to the tenant by increasing the compensation, in case of disturbance, so as to cover all loss incurred thereby, to a year's rent, and, if the whole loss exceeds this sum, even two years' rent. It further gives compensation, on certain conditions, for improvements made by the tenant whether he may be required by the terms of the lease to make them or not. Moreover, however good and sufficient the landlord's reasons for getting rid of a tenant (the wish, for instance, to terminate the tenancy of the home farm in order to cultivate it himself) compensation for disturbance shall nevertheless be made, where there is no fault on the part of the tenant.

The Act also introduces the principle of minimum prices, which are to be fixed by Commissioners, and are to rise or fall in the same proportion as the cost of production. It empowers the Board of Agriculture to compel, within certain limitations, the owner or occupier to cultivate in accordance with the rules of good husbandry in cases in which the production of food can be increased by improved cultivation. The Act has, however, been subjected to no little criticism in the interest, not merely of

the landlord, but of the consumer and even the farmer himself, whose industry, it is contended, would benefit far more from the stimulus of economic competition, than from Government protection and control.

Another grievance arising from the havoc to crops caused by the preserving of game was mitigated by the Ground Game Act of 1880. Before the passing of this Act the tenant was, indeed, entitled by the common law to kill rabbits for the protection of his crops and to claim compensation for damage from this cause. But the right might be limited or excluded by the terms of his lease and it did not extend to hares. It was, moreover, difficult to substantiate any claim for compensation and such a claim was apt to induce friction with the landlord, which might easily react unfavourably on the tenant's interest. "In most cases," says Sir C. N. Johnston (Lord Sands), "landlord and tenant found it easy so to adjust and respect their mutual rights that the landlord enjoyed his sport and the tenant suffered no injury greater than he ought fairly to have counted upon on entering into the lease. Unfortunately, however, there were cases, exceptional no doubt, but quite numerous enough to attract general public attention, in which game preserving was carried by landlords, or more frequently by game lessees to an extent which was most oppressive." Hence the Ground Game Act, which gave the tenant the right to protect his crops by killing not only rabbits, but hares, and made the right inalienable by any contract or agreement. In the Agricultural Holdings Act of 1908 the right to compensation for injury to crops by winged game or deer was granted.

Though the conditions of tenure were materially improved by successive Acts of Parliament, the increase of cultivation, characteristic of the first three-quarters of the century, was not maintained in the last quarter of it. The fall in prices due to increasing oversea competition tended to lessen the production of grain and led to the increase of stock raising. The acreage devoted to wheat growing, for instance, fell from 223,152 acres in 1857 to 81,185 in 1877. Forty years later, in 1917, it had fallen to 60,931. Similarly the production of barley decreased from 269,845 acres in 1877 to 159,135 in 1917, whilst in the case

of oats the increase was insignificant, being respectively 1,024,882 and 1,041,543 acres. In the case of green crop there was also a considerable decrease. On the other hand, the acreage of permanent pasture and grass under rotation shows a marked increase from 2,542,088 acres in 1877 to 2,903,711 in 1917, and nearly the whole of this increase is assignable to permanent grass. Stock raising thus displaced arable farming to a considerable extent during these forty years.

The effect of the last two years of the war has, however, been to bring more land under grain and other cultivation and with the quickened sense of the importance of corn-growing, which the war has produced, and which the Act of 1920 is intended to foster, there seems to be a likelihood that this increase will continue, though a portion of the additional land ploughed has been found to be unsuitable for this purpose.

In the cultivation of garden produce Scotland has attained a well merited preeminence. The Scottish gardener has taken the lead in his profession in the United Kingdom in which he may be described as ubiquitous. Fruit growing under glass is carried to a state of perfection unsurpassed and probably unequalled in any other country, and the open air cultivation of fruits and vegetables, suitable to the climate, is correspondingly advanced. Much of the progress is due to the energetic and enlightened efforts of the numerous horticultural societies and to the increasing attention devoted to scientific training and equipment. Market gardening has likewise become an important industry and a considerable area in the neighbourhood of the larger towns is devoted to this purpose. Fruit farming for the purpose of jam-making has developed in certain regions, particularly in Perthshire and Lanarkshire, where the soil has been found to be specially adapted for the growing of raspberries and strawberries. Crieff, Auchterarder, Blairgowrie, and Lanark are the chief centres of this thriving industry.

There has been a remarkable advance during the nineteenth century in stock breeding, which is largely due to the interest in the subject fostered by the Highland and Agricultural Society and the county and local agricultural societies. The Clydesdale breed of horses is superior to that of any other country for

heavy draught work. It has long ceased to be exclusively raised in the region from which it originally took its name and is bred in other parts of Scotland. Large numbers are exported to the United States, the British Dominions, and other oversea lands. The premiums offered by the agricultural societies to induce the owners of first-class stallions to circulate them for breeding purposes in particular districts have contributed to maintain this superiority.

Scotland possesses four native breeds of cattle—the Ayrshire, the Polled Aberdeen or Angus, the Galloway, and the West Highland. In addition to these the Shorthorn breed was introduced from England into Scotland early in the nineteenth century and gradually extended northwards through the eastern lowlands to the Pentland Firth. Its introduction was due to Mr Robertson of Ladykirk, in Berwickshire, and Mr Rennie of Phantassie, in East Lothian. Early breeders in Aberdeenshire were Captain Barclay of Ury and Mr Cruickshank of Sittyton. Shorthorns are imported in considerable numbers from Ireland and the North of England for fattening in the southern and eastern counties. The Ayrshire cow, whose improvement by crossing with the English shorthorn dates from about the middle of the eighteenth century, is first favourite with the dairy farmer in virtue of the quantity and the quality of her milk, the average per cow being from 480 to 500 gallons of rich milk. Consequently cheese and butter making has greatly developed in Ayrshire and the south-west of Scotland. Dairy farming has, however, spread to other districts, and is now more or less extensively prosecuted in the neighbourhood of the larger towns and even in some of the remoter districts which have quick through communication by rail. The native supply of butter and cheese is, nevertheless, far below the demand, and an enormous quantity is imported from abroad.

The north-eastern counties, on the other hand, form the chief beef-producing centre and their polled breed deservedly takes first place in the English meat markets, " prime Scots," as it is termed, invariably heading the quotation lists. The magnificent herds of these animals which may be witnessed grazing in the fields in summer, or stalled in winter in the byres of any fair

sized farm of the north-east, are perhaps the finest achievement of the Scottish farmer. The high state to which the breed has been brought owes much to men like Mr Watson of Keillor, and especially to Mr McCombie of Tillyfour, whose exhibition of these splendid animals at the Paris Exhibition of 1878 beat that of any other country in this particular competition. Their fame has spread the world over and extraordinary sums are paid by home and foreign breeders for breeding cows and heifers. At the Montbletton sale, near Banff, in 1882, for instance, a seven-year-old cow fetched 325 guineas, and her three-year-old daughter 295. In the same year at the Earl of Airlie's sale at Cortachy Castle three cows realised 300, 400, and 500 guineas respectively. In the following year the price of a yearling heifer belonging to the herd of Mr Auld of Bridgend rose as high as 510 guineas. At Perth in 1918 Mr Kerr of Harvieston paid 2100 guineas for a bull calf bred at Ballindalloch, and a year later 4000 guineas were obtained at Perth for a bull belonging to Lady Cathcart. This record was broken by the price paid in 1920 for a ten months' old calf belonging to Mrs Stewart of Millhills, which fetched 6600 guineas.

Galloways are similar to the Polled Angus, but do not mature so early, whilst tougher and thriving better on high-lying, exposed pasture and, therefore, much in vogue as recruits for the prairie herds of the Far West. In this latter respect the splendid West Highland cattle are unique, with their shaggy hair, grand horned heads, magnificent proportions, and their adaptability to the mountain pasture and wild winter climate of the Highlands. In many districts they are never stalled and require artificial feeding only in the severest seasons.

Of sheep the two native varieties are the Cheviot and the Blackfaced, but Border Leicester, Half Breeds, Blackfaced Cross, and Shropshire Downs are also reared in large numbers, whilst Orkney and Shetland have their own particular breed of a small, but hardy variety with soft, silky wool. The mountainous character of a large part of Scotland explains the prevalance of the two first-named breeds, which are adapted to high altitudes and maintain themselves on the wild pasture of the hills and moors. This fact lends an agricultural value to these

elevated regions which they would not otherwise possess and sheep farming is the staple industry of the Southern Uplands and the Highlands of Scotland. From about the middle of the nineteenth century attempts were made by Mr James Brydon to improve the Cheviot breed, and the improved breed was in high favour until it was found that the attainment of size and beauty had been achieved at the sacrifice of hardihood—an essential of a mountain sheep. The Cheviot was introduced by Sir John Sinclair into the Highlands about 1790 and thrives well in the lower altitudes. But on the higher altitudes only the Blackface, which was introduced from the Southern Uplands, can stand the inclemency of the Highland winter.

The total number of sheep maintained in Scotland in the year 1917 was 6,873,234, of cattle 1,209,859, of horses 210,048. Pig breeding is also extensively carried on, though this industry shows a decline in recent years compared with forty years ago, the figures being 132,945 for 1917, 153,237 for 1877, and 188,307 ten years earlier. It has, however, been taken up as a special industry in districts with a large concentration of population, where the supply of appropriate feeding stuffs is available. The same is true of poultry farming, which is being specially prosecuted in many districts.

The breeding and feeding of cattle has in recent pre-war years been less profitable than formerly. The importation of foreign cattle for fattening has been forbidden because of the risk of disease, whilst the importation of fat cattle has been permitted. The farmer has accordingly to face a growing competition in the finished article, whilst he is prevented from importing what we might call the raw material of this branch of his industry. Moreover the foreign and home products are allowed to be sold in the shops without any compulsory discrimination between them. This is distinctly unfair to the home producer, who complains that the middleman gets the lion's share of the profit.

A steady improvement in the method of cultivation is apparent throughout the century and this improvement is due in large measure to the progressive application of machinery and scientific knowledge to agricultural operations. The reaping machine has almost entirely displaced the scythe in the mowing of grain and

hay. Various attempts were made in the early years of the century by Mr John Gladstones of Castle Douglas, Mr Alex Kerr of Edinburgh, and Mr James Smith of Deanston, to solve the problem of constructing an appliance for this purpose, for which the Highland and Agricultural Society offered a premium. Though favourably reported on at the time, none of these proved of permanent practical value. The first to construct a really workable machine was the Rev. Patrick Bell of Carmyllie who, in 1827, invented a reaper which was used for some years on Forfarshire farms and secured for the inventor a premium of £50 from the Highland and Agricultural Society. Forty years later he was presented with £1,000 subscribed by Scottish agriculturists in recognition of his services. On coming home one day from the harvest field on his father's farm at Inchmichael, Mr Bell was seized with the desire to invent a machine that would lessen the labour of the harvester. His eye lighting on a pair of garden shears hanging near, he conceived the idea of clipping corn by machinery and constructed a small wooden model of such a reaper. With this model he proceeded to Edinburgh and showed it to Sir John Graham Dalyell, who had considerable knowledge of mechanics. Sir John encouraged him to construct a machine for trial in the following harvest and the trial was a success. The presentation was a well merited one, for, apart from its practical merits, the machine seems to have exercised some influence on the further development of the reaper. Four of the machines were sent to America and it was to American as well as English mechanical ingenuity that the reaper owed its later perfection. An exhibition of American machines at the International Exhibition of 1851 gave an impulse to the gradual adoption of the manual delivery machine which was followed by the self-delivering machine, and ultimately by the combined reaper and binder whose use is now universal.

The application of steam to agriculture was exemplified in the attempt, suggested by the eighth Marquess of Tweeddale in 1837, to construct a steam plough. In this year the Highland Society offered a premium of £500 and sent a deputation to Lancashire to examine a plough invented by Mr Heathcot. It

worked satisfactorily in the mossy ground in which the trial took place, and was brought down for exhibition in connection with the Society's show at Dumfries in the same year. It was tried for three days in the Lochar Moss, near Dumfries, but during the night after the third day's trial it disappeared in the Moss, where it still lies buried. The premium, having failed to produce an invention, was withdrawn in 1843. Another offer in 1851 and 1852 produced two contrivances by Mr James Usher, Edinburgh, and the Messrs Fisken of Gellyburn, Strathearn. Neither of them was adjudged satisfactory, and it was not till 1857 that Mr Fowler was awarded a new premium for a machine which was satisfactorily tried at Stewart Hall, near Stirling. Several sets of steam ploughs were later in operation on the hiring system in various districts, but the working of them was found to be satisfactory only in level land free from stones and other obstacles, and has only been adopted to a very limited extent. The motor tractor and the motor plough have, especially under the stress of the war, begun to make their appearance, and seem to have a better chance of coming into general use. The horse swing plough, which has undergone several improvements since its invention by Mr Small in 1760, still holds the paramount place in the tillage of the soil. On the other hand, steam was successfully applied to drive the threshing mill, and displaced water power on many farms before the portable threshing machine, drawn by traction engines, came into vogue. Invention has also been busy providing other implements which the progress of agriculture has demanded, such as the drill plough with double boards, the sowing machine, which has largely ousted the old method of scattering the seed by the hand, the cylindrical roller, which has displaced the old wooden roller, the grubber, the iron and the chain harrow, the milking machine, the turnip hasher, the potato planter and digger, the horse rake, the hay-making machine, etc.

The application of science to agriculture has been an essential of its nineteenth century development. The ordinary farmer is naturally conservative, clinging to the ways of his fathers and not too ready to entertain any innovation. This feeling long militated against progress. But prejudice in favour of use and

wont has gradually been giving way to the conviction that agriculture, like every other industry, depends for its full success on the practical application of the scientific data applicable to it. The recognition of this fact is already apparent among the more enlightened agriculturists of the later eighteenth century, and it found expression in the foundation of the chair of Agriculture and Rural Economy at Edinburgh in 1790, which was endowed by Mr Johnstone, a member of the Faculty of Advocates, better known as Sir William Pulteney. Chairs or lectureships have since been founded in all the Scottish Universities. Institutions specially devoted to the scientific education of the young farmer have been established in the Agricultural Colleges affiliated with the Universities of Edinburgh, Glasgow, and Aberdeen. Experimental farms on scientific principles form part of the equipment of these colleges, and others are carried on by the Board of Agriculture, which was reconstituted in 1911, and by directing agricultural policy, encouraging research, and supplying scientific information, has been of great benefit to the industry. The wide scope and practical effects of its activity may be studied in detail in the important annual reports presented to Parliament.

Not the least share of the merit of this development on the practical side is due to the numerous agricultural societies, chief of which is the Highland and Agricultural Society, founded in 1784 under the name of the Highland Society for the improvement (including agriculture and manufactures) of the Highlands. In 1787 it received a royal charter, and two years later a grant of £3000 to enable it to carry out its objects. It strove at first to realise these objects by giving prizes or premiums and medals for essays on prescribed subjects relative to the Highlands, and for merit in practical farming in the Highland districts. Premiums were given, for instance, for the best results in the cultivation of grasses and potatoes, in the rearing of stock, the reclaiming and improving of waste land, the improvement of agricultural implements and machinery, draining and irrigation, butter and cheese making. In addition to the sums expended in furthering these practical objects, the Society evinced a keen interest in the language and literature of the Highlands. It published a valuable contribution to the Ossianic controversy, and made a collec-

tion of Gaelic manuscripts, now in the Advocates' Library at Edinburgh. In 1828 it published a Dictionary of the Gaelic language, and fifty years later voted 100 guineas towards the endowment of the Gaelic chair in the University of Edinburgh. In 1809 it offered for the first time honorary premiums for afforestation, and such premiums were awarded in 1821-22 to various proprietors in the Highlands who had planted considerable areas of their estates, the lead being taken by Mr Mackenzie of Kilcoy with over half a million of trees covering 379 acres, and Sir James Colquhoun of Luss with about 400,000 in about 61 acres. This departure became a regular part of the Society's policy, but the progress of forestry in Scotland in the nineteenth century slackened considerably owing to the decline of the early enthusiasm for planting, and only revived late in the century. This revival was due to the energy of the Royal Scottish Arboricultural Society, with which the Highland Society has co-operated, and latterly of the Board of Agriculture. Early in the century it turned its attention to the encouragement of farm management by the improvement of various kinds of grasses, the breeding of stock, the growing of turnips and potatoes, the curing of butter, beef, and pork by means of premiums for such objects. In 1801 it instituted the first ploughing match at Hoddam, in Annandale, and in 1822 organised its first show, which was held in December of this year in an enclosure behind Moray House, Edinburgh, and consisted of an exhibition of fat stock of various breeds. From this modest beginning the great annual exhibition of stock, implements, and produce gradually developed, and this development may be measured by the fact that whereas the drawings at the first exhibition amounted to £51 10s., the sum drawn at that at Edinburgh in 1919 rose to about £17,000. It also gave an impulse to the formation of the numerous county and district societies and shows, which have contributed so much to energise local effort.

Equally praiseworthy was the endeavour to further agricultural education. To its advocacy was due the grant by the Government of £150 for ten years for the better endowment of the chair of Agriculture at Edinburgh University in 1868, to which it guaranteed an equal sum for the same period. In 1856

it took up the question of the education of young agriculturists and obtained a supplementary charter entitling it to grant diplomas in the science and practice of agriculture to successful candidates after examination. Sixteen years later it appointed a Board of Examiners in Forestry, which granted certificates to students of approved practical efficiency. Its work in this direction has, however, been superseded by that of the agricultural colleges, in whose institution it bore a creditable part, and of the County Councils which provide lecturers and demonstrators in rural districts in methods of agricultural production. In 1823 it made a grant for veterinary instruction to Mr Dick, certificates being awarded to students who passed the requisite examination entitling them to practise as veterinary surgeons. This venture developed into the establishment of the Dick Veterinary College at Edinburgh in 1839 under its auspices. It was, however, rather backward in taking up the project of an experimental farm, which was repeatedly brought before it from 1821 onwards. The expense of maintaining such a farm was the chief obstacle, and there was not a sufficiently general sense of the value of science to agriculture to induce the members to face the financial risk involved. It was not till 1877 that it leased two experimental stations in East and West Lothian for the purpose of determining the agricultural value of various manures in the production of a rotation of turnip, barley, grass, and oat crops. This policy has been energetically taken up in recent years by the Board of Agriculture, which has acquired a number of experimental farms throughout the country.

One effective result of the more general sense of the value of scientific farming is apparent in the application of chemical manures, guano, ground bones, etc., which enabled the farmer to cope to some extent with the fall in prices by increasing his produce per acre. By this expedient much land has been kept in cultivation which would otherwise have gone into pasture. There are large agencies for these manures in Glasgow, Leith, Dundee, Aberdeen, etc., and their produce is marketed over a wide area.

Under the landlord and tenant system farms in Scotland are of considerable acreage, and often of large extent. To acquire

the tenancy of an ordinary farm requires a considerable capital, and accordingly this system suffers from the drawback of rendering it very difficult for the competent farm servant to rise to the position of a tenant. To remedy this drawback, and also counteract the tendency to rural depopulation, consequent on the increasing emigration from country to town, the policy of creating small holdings has been adopted, and legislation has been passed conferring on the Board of Agriculture powers to acquire land for this purpose (Small Landholders' Act of 1911) in the Lowlands as well as the Highlands. These powers were amplified by the Small Holding Acts of 1916 and 1918, and in the Land Settlement Bill introduced by the Scottish Secretary in 1919.

The question of making such a provision has long been an urgent one in the Highlands. The unsatisfactory state of this region is traceable to the arbitrary action of the proprietors over a century ago in transforming the land into large sheep farms and clearing out the crofters from the interior of the counties of Sutherland, Ross, and Inverness, and settling a residue of them on patches of ground on the coast, where they formed crofting townships. The land so cleared was used for rearing sheep instead of rearing men, and when sheep farming became less profitable owing to competition in wool and mutton from the Colonies and elsewhere, large sheep farms were turned into deer forests and let at high rents to wealthy sporting tenants. The crofters who were allowed to settle in these townships were unable to find a sufficient maintenance for themselves and their families, since they were prevented from extending their holdings, although there was plenty of land of a kind for this purpose. Moreover, the population, in spite of emigration, had been greatly increased by the kelp industry which flourished during the second half of the eighteenth century and the early part of the nineteenth, until it was ruined by the reduction of the import duty on salt and barilla. It was then that the fell effects of the land policy which was clearing the people out of their holdings at a time when the population had increased and employment had materially shrunk, became most severely felt. Misery, migration, and depopulation, aggravated by bad seasons and disease, were the inevitable fruits of this hard and narrow, if, for

the landlords, profitable policy. The government appointed a commission in 1841 to enquire into the prevailing destitution, and the commission could only suggest emigration as a remedy. The failure of the potato crop in 1846 and the following four years emphasised the urgency of remedial measures, and during these years the starving people subsisted largely on public subscriptions administered by Destitution Boards in Edinburgh and Glasgow. The proprietors gave what pecuniary assistance they could, and some of them, like Lord MacDonald and MacLeod of MacLeod, spent all their resources in contributing to the relief of their tenants. Such an emergency measure left the economic situation unchanged. The State did little or nothing to remedy this situation, except to prescribe emigration, and eviction for non-payment of rent was frequent. The result was friction and unrest, which at last in the early " eighties " broke out in acts of violence in Skye, Lewis, and other regions. The crofters resisted attempts to oust them from their holdings, and even took possession of the land in some places in order to enlarge their crofts. This drastic action led to collisions with the police and even the military forces of the crown, and the trial and imprisonment of some of the offenders. It forced the Government to appoint a Commission of Enquiry in 1883, which forms the first serious attempt to deal with the problem. The Commission recommended the recognition, extension, improvement, and registration of existing townships and the formation of new ones, and these townships were not to be reduced or dissolved without the consent of two-thirds of the occupiers. In addition to enlarged townships, compensation was to be given for improvements and state aid to enable the crofters to purchase their holdings.

The result of this report was the Crofter Holdings Act of 1886, which conferred security of tenure on certain conditions, a fixed fair rent, compensation for improvements, and facilities for the enlargement of holdings. The Act also instituted a body of commissioners—the Crofters' Commission—with both executive and judicial functions. It continued to perform these functions for twenty-six years until it was displaced by the Land Court instituted by the Small Holders Act of 1911. During this period it dealt with 22,111 applications for a fixed fair rent, and reduced

these rents by about one-fourth, besides cancelling arrears to the extent of 67 per cent. of the total amount dealt with. It received 4,364 applications for enlargement of holdings, and made enlargements to the extent of fully 72,000 acres. There was, however, little improvement of the cultivation of the soil, and in addition to poor crops overstocking was a prevalent evil, which the Grazing Act of 1908 attempted to remedy. To alleviate the congestion a special board—the Congested Districts Board—was formed in 1897, which up to 1912 created 640 new holdings and granted enlargements to 1,138 crofters. All this well-meant legislation and effort did not, however, allay discontent, which sometimes showed itself in lawless disturbance, and the Land Court, which displaced both these bodies in 1912, has in recent years been engaged with considerable effect in improving on the work of its predecessors. Even so, occasional crofter raids seem to show that the problem of establishing a feasible existence for the crofting population is by no means finally settled.

The condition of the agricultural worker was materially improved throughout the century. Compared with the second half of the eighteenth century he is better paid, housed and fed, and works shorter hours. The regular working staff of a good sized farm consists of a grieve, a foreman ploughman, ordinary ploughman for each pair of horses, a cattleman, a shepherd, and men, women, and boy labourers, with extra workers at certain times, though the increasing use of machinery has tended to reduce their number. These are engaged at fairs or feeing markets, the married men usually for twelve, the unmarried for six months. Unlike the English farm workers, those of Scotland show a growing tendency to migrate from farm to farm after a year or two's engagement. About the middle of the century regular farm work extended over 11 hours a day, besides extra time in attending to horses. The number was subsequently reduced to 10 in summer and from dawn to dusk in winter, and more recently the demand for a 48 hours' week has made itself heard. The introduction of the weekly half-holiday has, however, considerably lessened the total number of hours worked per week, and the lot of the worker is distinctly less arduous and exacting than formerly. Housing, which was still bad before

the middle of the century, was improved during the second half of it, though the improvement has been much greater in some regions than in others, especially in the counties of Berwick, Roxburgh, and East Lothian, and, generally speaking, still leaves much to be desired, according to the Report of the Royal Commission on Housing. In some parts of the Highlands it is deplorable.

In crofting areas, like Lewis and the Outer Isles, civilisation, as far as housing is concerned, is still that of the primitive age. "The housing conditions in Lewis are deplorable. A great number of the houses are of the 'black type,' rough stone walls with thatched roofs, no fireplaces or chimneys. In many the cattle are housed under the same roof as the human beings, and one has to go through the byre before the living accommodation is reached. The byre and kitchen are separated from each other by a wooden partition (though in some cases this is awanting), which often does not extend to the roof. As the manure from the byre is removed only once a year, the conditions can be better imagined than described. In the living room the fire of peats is built up on the ground, surrounded by a ring of flat stones, in the centre of the room, and the smoke finds an outlet where it can. As the thatched roof does not extend to the eaves, but only to the centre of the wall, it is needless to say that the wall,—which between the two layers of dry stones of which it is built is packed with earth or turf—is more or less constantly damp. Many houses of the worst type have no window or only a small one in the roof. This so-called window is, however, often grass covered. Any light is obtained from the fire or lamps. The sites and surroundings of the houses are most unhealthy."

According to a recent statement of Lord Lovat in the House of Lords, in no fewer than 107 houses in Skye on the Government's own property cattle and men were under the same roof. In Lewis no fewer than 5,000 houses required repair, and in something like 1,000 houses cattle and men lived under the same roof, separated only by a sheet or boards. The defects of crofting housing had led to greater depopulation than any other cause during the past thirty years.

The system of lodging and feeding farm servants in the farm house declined from about the middle of the century onwards, and in the southern and eastern counties it has almost disappeared and survives only on smaller farms in these regions. The bothy system, under which the unmarried workers live in a " bothy " and cook their own food, still prevails in the north and east, but has greatly declined or become extinct in the south and south-west. It is not conducive to comfort or health and has been condemned by all the commissions of inquiry appointed in the second half of the century. " It would be difficult to say," remarks Mr Pringle in reviewing in 1894 the evidence furnished by these commissions, " which of the reports, 1867, 1879, or 1893, is strongest in its terms of condemnation; but in one point they agree : they recognise the difficulty of altogether abolishing it; but they believe that a great deal could be done by increasing the supply of farm cottages to reduce the necessity for such places." It certainly had its share of the responsibility for rural depopulation, and to those who remember what it was in the days of their youth forty or fifty years ago the wonder is that men could be got to endure its discomfort and its usually deteriorating effect.

More substantial has been the improvement in wages and other earnings in the shape of meal, potatoes, and free house and garden. In the case of ordinary married ploughmen, Mr Pringle calculates the approximate increase during the second half of the century at about 69 per cent., though the rise varies with the county or district. There is a similar advance in the case of other farm workers. Wages have not suffered from agricultural depression, and the worker has also benefited by the fall in the prices of provisions. One result has been a corresponding rise in the standard of living. About the middle of the century the use of butcher meat was still very limited and oatmeal and potatoes were still the staple diet. By the end of the century the use of meat had become common, at the expense, however, of the decrease in the use of oatmeal, which is greatly to be deplored. On the other hand, the rise in wages does not seem to have been accompanied by the practice of thrift. " The great increase in wages and general improvement in other things have

not been accompanied by any endeavours to lay by money or anticipate old age. The fact of more money coming in only means more money going out in the case of 75 per cent. of our labourers. The few who deny themselves luxuries in ordinary everyday life can and do save; but the same took place on the miserable earnings of forty years ago." In the judgment of the commissioners of 1892-93 the condition of farm workers is on the whole highly satisfactory. It is, however, questionable whether the workers themselves would generally subscribe to this judgment, and Mr Pringle admits the presence of a spirit of discontent, especially in regions in the neighbourhood of the industrial cities. Trade Unionism has penetrated the agricultural population, and in the Scottish Farm Servants' Union the workers have an active organisation which agitates for improved conditions in their interest. Certain it is that these conditions are not such as to induce the people to remain on the land in the face of the attractions of the towns or the colonies, and too large a proportion of the agricultural population has succumbed to these attractions, with the result of steadily increasing rural depopulation. The use of machinery has, indeed, lessened the former scope for manual labour. Increased transport facilities, the lure of higher wages in the industrial centres, and increasing inducements to emigrate have also had their effects. But there are factors of a social as well as an economic nature which irresistibly tell in the direction of depopulation. The energetic, ambitious worker has too little scope for the realisation of his aspirations. The prospect of rising from servant to master is too limited under a system which necessitates a considerable capital to take and stock a farm. Small holdings is the policy by which a remedy is being sought under the Small Landholders Act. Whilst opinions differ widely as to its feasibility, there can be no doubt of the advisability of seeking to remedy this defect in the interest of the better class of agricultural worker. These workers form a most valuable element of the population, and it is essential to raise their status, which has long been rated on a low scale, and as far as possible give them a better prospect in life.

It is only fair to let them speak for themselves in this matter, as voiced by Mr Duncan, the Secretary of their Union, in a tem-

perate address to the conference on the improvement of agriculture in August, 1917. " What ought first to be done is to let the workers feel in social life that they form the vital part they do in the industrial life of the community. The social defect in Scotland tells seriously on the man, but more so on the farm servant's wife, and, due to the way in which the people are scattered, there is no opportunity for the children. Often, leaving home at the age of 14, they are never again in contact with the family. Further, the farm worker, like all other workers, is suffering from what is called ' labour unrest.' We had it before the war, and we have it now. . . . In the trend of things there is the indication that there are aspirations rising among the workers—aspirations that are not confined to questions of wages and material things of life. It is the desire of the worker to have some control over the disposal of himself, some share in the control not only of government, but of industry also. This will have to be dealt with on the farm as in the industrial field. Unless we can give some opening or outlet to that spirit, there is no hope of keeping a contented or settled population in the rural districts. . . . He would then become a partner in the industry and not merely a wage earner who is directed at every stage of his work. . . . The erection of ladders like small holdings will not satisfy the farm workers. There are 70,000 of them in Scotland and we cannot provide small holdings for them all. All these fancy schemes will never touch the kernel of the problem which is to deal with the mass of the workers living on the farm. The workers' aspiration is towards more self-control, more self-guidance, and an opportunity to share in the enlightenment that science is bringing to everybody—an existence that is not merely the existence of a wage earner." A remedy for the lack of social life in the country districts, to which the speaker referred, has recently been sought in the establishment of rural Institutes for the education and recreation of the people.

To Scottish agriculture the war may be said to have been a blessing in disguise. It at least has not been devoted to the mad work of destruction, as in the case of other industries, and its prosperity was the well-earned reward of intensified productive energy in the increase of the national food supply during a

protracted period of threatening shortage. Prices have risen, more land (some of it, however, unsuitable land) has been brought under cultivation, and, more important, agriculture has been shown to be still a prime industry, to neglect which is to imperil the national safety. It would be rather misleading to give figures in proof of this advance during the war period, since the conditions have been so abnormal. Such an advance is the usual concomitant of war, especially a protracted war, which produces in the industry a state of unnatural excitation. At all events the general conviction among the farming class seems to be opposed to the policy of state tutelage and regulation, and not too friendly to the guaranteeing of grain prices unless the guarantee is extended to the chief agricultural products. Even protection is no longer regarded as a panacea against agricultural depression.

3. The Mining, Iron, and Steel Industries

In the search for coal the geologist has rendered valuable help to the engineer by placing at his disposal scientific information as to the particular location of coal, ironstone, and oil shale in any given area, and the probable strata to be penetrated in the attempt to reach these minerals. To ascertain the actual presence of the mineral and the thickness of the seam, boring is resorted to, and for this purpose a variety of appliances, driven by steam power, are used according to the nature of the strata and the depth to be bored. The next operation is the sinking of the shaft. Before the invention of the atmospheric engine by Newcomen in 1710 the depth of mine shafts was limited by the difficulty of carrying off the water. Sixty fathoms was about the greatest depth attainable in the United Kingdom, the diameter of the shaft being at most between 7 and 8 feet. Since then this depth has been greatly exceeded, and already in 1840 the shaft at Nitshill, Renfrewshire, had a depth of 175 fathoms. By the Coal Mines Regulation Act of 1887 each mine must in ordinary circumstances have at least two shafts, with which every working seam must be connected and between which there

must be a communication of not less than 4 feet high by 4 feet wide. The shafts in Scotland are usually rectangular, but in recent times the circular shaft has been adopted, as at Niddrie Colliery, with a diameter of 17 feet. The eliptical form is also in use in the Wemyss Collieries in Fifeshire. For shaft making, implements and machinery of a very varied kind, according to the nature and depth of the strata to be worked through, have been devised.

The shafts having been made, main roads are constructed by blasting and drilling in the area to be worked. Two methods of working the coal are in vogue—the bord (Saxon for road) and pillar, and the long wall methods. The former, known by the local name of " stoop and room," is that mainly in use in Scotland, and consists in driving passages or " rooms " through the coal of from 12 to 20 feet wide, leaving pillars or " stoops " of the coal, between 10 to 20 yards square to support the roof of the passage. These pillars remain till the limit of the seam is reached, and are then cut away, the miner working backwards and using wood props to support the roof. By the long wall method the whole of the coal is removed as the miner works inward and the passage maintained by walling it with stone or waste. Modifications of both systems are also in operation.

Ventilation is an essential in order to dilute and remove the noxious gases in the mine and thus secure as far as possible the safety of the miner. Fire damp was long considered to be the main cause of explosion, but coal dust was ultimately found to be an equally dangerous factor, as Mr Galloway showed in 1878, though it was only in recent times that the subject was thoroughly investigated and convincing proofs of the fact accumulated. To ventilate the mine the expedient of the furnace was long in use, but this expedient has been largely superseded by ventilating fans driven by steam or electricity. The invention of the safety lamp by Sir Humphrey Davy in 1815 further contributed to the safe working of the mine.

In the early days of coal mining in Scotland, when the mines were comparatively shallow, the coal was carried by bearers along the pit bottom and up the stairway in the shaft to the pit mouth. In the mines in the eastern district these bearers were generally women and even children of tender years, and the

weight carried by the women might be as high as several hundredweights. The physical and moral effects of such toil, protracted over 15 or even 18 hours out of the 24, were deplorably bad. Mechanical hoisting in cages drawn up the shaft by windlasses driven by horse power, and later by steam winding engines, ultimately superseded the primitive method of carrying the coal in buckets up the wet and slippery stairway. It was still in vogue in the Lothian coalfield in the beginning of the nineteenth century, and the laborious operation is described by Mr R. Bald in his *General View of the Coal Trade of Scotland*, published in 1808. "In these collieries, where this mode is in practice, the collier leaves his house for the pit about 11 o'clock at night (attended by his sons, if he has any sufficiently old) when the rest of mankind are retiring to rest. Their first work is to prepare coals by hewing them down from the walls. In about three hours after, his wife (attended by her daughters, if she has any sufficiently grown) sets out for the pit, having previously wrapped her infant child in a blanket and left it to the care of an old woman, who, for a small gratuity, keeps three or four children at a time, and also, in their mother's absence, feeds them on ale or whisky mixed with water. The children who are a little more advanced are left to the care of a neighbour; and under such treatment it is surprising that they ever grow up or thrive. The mother having thus disposed of her younger children, descends the pit with her older daughters, when each, having a basket of suitable form, lays it down, and into it the large coals are rolled; and such is the weight carried that it frequently takes two men to lift the burden upon their backs; the girls are loaded according to their strength. The mother sets out first, carrying a lighted candle in her teeth; the girls follow, and in this manner they proceed to the pit bottom, and with weary steps and slow ascend the stairs, halting occasionally to draw breath, till they arrive at the hill or pit top, where the coals are laid down for sale, and in this manner they go for 8 or 10 hours almost without resting. It is no uncommon thing to see them, when ascending the pit, weeping most bitterly from the excessive severity of the labour; but the instant they have laid down their burden on the hill, they resume their cheerfulness and return

down the pit singing. . . . The weight of coals thus brought to the pit top by a woman in a day amounts to about 36 cwts., and there have been frequent instances of 2 tons being carried. The wages paid them for this work are eightpence per day."

Even after the abolition of this drudge system female and child labour was retained for transporting the coal from the working to the bottom of the shaft, and the report presented to Parliament in 1842 by the commissioners appointed at the instance of Lord Ashley, afterwards Earl of Shaftesbury, revealed the shocking conditions under which this labour was carried on. "In the East of Scotland," the commissioners reported, "where the side roads do not exceed from 22 to 28 inches in height, the working places are sometimes 100 and 200 yards distant from the main road; so that females have to crawl backwards and forwards with their small carts in seams in many cases not exceeding 22 to 28 inches in height. The whole of these places, it appears, are in a most deplorable state of ventilation. The evidence of their sufferings, as given by the young people and the old colliers themselves, is absolutely hideous."

The result was the Act of 1842, prohibiting the employment of boys under 10 years of age, limiting the period of apprenticeship, and putting a stop to the employment of women.

The method of conveying the coal underground by small baskets was displaced by the use of larger ones shod with iron and dragged by men or horses. Still later these were superseded by small railways, wheel carriages, and to a certain extent steam haulage. Coal cutting machinery driven by compressed air is also in operation in a number of collieries. Electricity for the purpose of signalling and electric lights in the main roads are among other improvements.

The main coalfields are situated in the central counties and the largest output is still from those of Lanark and Ayr. In recent years there has, however, been an extension of the mining industry in the Lothians and Fife, and this extension eastwards has been actuated by the necessity of finding new sources in view of the steadily increasing demand and the possibility of the ultimate exhaustion of existing fields. Industrial development is dependent on coal supply. As the late Mr Stanley Jevons

pointed out, "coal stands not beside, but entirely above all other commodities. It is the material source of the energy of the country—the universal aid—the factor in everything we do; without it we are thrown back into the laborious poverty of early times." For the production of iron and steel, for the generation of propulsive power on land and sea, for the working of factories, for instance, coal is an essential requisite. Britain's industrial greatness ultimately rests on its coal mines. Hence the growth of the coal output with the growth of such enterprises. This growth has, accordingly, steadily advanced during the nineteenth century, and from about the middle of it it has been almost quadrupled, though the industry has been subject to frequent strikes adversely affecting the output in the years in which they have occurred. In 1854 it was nearly 7½ million tons; in 1880 it was fully 18¼ millions; in 1900 it had risen to over 33 millions; in 1908 to fully 39 millions. Throughout this period Lanarkshire has held the lead of the coal producing counties with more than half the whole tonnage, its total in 1900 being over 17 millions. Fifeshire was second with about 5½ millions, Ayr third with fully 4 millions, Stirling fourth with nearly 2⅓ millions, Midlothian fifth with 1⅓ millions, and West Lothian sixth with fully 1 million, whilst Clackmannan, Dumbarton, and East Lothian were near or over half a million, and Renfrew occupied the lowest place with about 13,000. In 1908 the proportion for Fife had risen to nearly 8½ millions, for Stirling to nearly 3 millions, Midlothian to nearly 2⅓ millions, West Lothian to nearly 2 millions, East Lothian to over 1 million, and Renfrew to nearly 100,000.

The export of coal bulks largely in Scottish export trade, of which by far the largest portion is centred in the Firth of Forth. From the Fife ports alone upwards of 5 million tons were shipped in 1913, Methil leading the way with 3¼ million and taking first place as a coal shipping port in Scotland, Burntisland being next with nearly 2½ millions. The total from the ports on the south side of the Forth—Leith, Granton, Bo'ness, and Grangemouth—was considerably over 4½ millions. In 1911 the total shipments from Scotland to home and foreign ports (including bunker coal) was 16¾ millions.

Oil shale is now mined only in Mid and West Lothian, though it is found in limited quantities in other districts and was formerly worked on a large scale at Burntisland in Fifeshire. Within the limited area mentioned it was also mined by the Clippens Oil Company at Straiton and Burdiehouse, but owing to litigation with the Edinburgh Water Trust, the Company was compelled to abandon operations. In one or two places—at St Catherine's, Liberton, near Edinburgh, and in the Broxburn district, for instance—natural oil in small quantities has been found. But practically the crude oil has to be extracted from the shale mined for the purpose, and in this respect the oil producing industry in Scotland is carried on under difficulties and disadvantages unknown in those more favoured regions of the world where the liquid is obtained from the vast reservoirs in the bowels of the earth, as in the oilfields of America, the Caspian, and Burma. " The Scottish oil," says Mr Caddell, " in its dry matrix of black shale, has first to be laboriously won—blasted out of mines hundreds of feet deep, hauled or hoisted by machinery to the light of day and crunched into small pieces between strong iron teeth, then carried perhaps some miles to the retorts, where it is carefully distilled and separated from its earthy casing—before it ever reaches the condition of the crude petroleum that spouts up in other countries ready made."

The oil shale is described by the same authority as " a minutely laminated, or amorphous black, or dark brown clay shale containing nitrogen, hydrocarbons, and other substances of organic origin derived from the macerated remains of plants and animals." The oil producing material in the shale was named Kerogen by Professor Crum Brown, and this substance is distilled into crude oil and refined into paraffin and other products.

The father of the industry was James Young, who was born in 1811, learned the trade of a cabinet maker at Glasgow, and after attending the lectures in chemistry of Professor Graham, became his assistant. Later he became assistant to the Professor of Chemistry at University College, London, and chemist at Tennant's Chemical Works, Manchester. Whilst occupying this latter post he was consulted by Professor Lyon Playfair about a petroleum spring in a coal pit in Derbyshire, where in 1848 he

erected works for refining the petroleum and where for a couple of years oils and paraffin were produced until the spring was exhausted. Young rightly inferred that the oil was the result of the natural distillation of coal and coaly substances, and in the course of his experiments he discovered in 1850 at Boghead, near Bathgate, a seam of what seemed to be cannel coal, but was in reality a rich kind of oil shale which yielded 120 gallons or more of crude oil per ton. In the same year he took out a patent for the production of paraffin from bituminous coal and in partnership with Messrs Meldrum and Binney started distillation works near Bathgate. Even before the expiry of Mr Young's patent in 1864 other works began to spring up throughout the region at Broxburn, Uphall, Mid-Calder, West Calder, Kirkliston, etc., and in 1865 Mr Young started new works at Addiewell, near West Calder. The decade between 1860 and 1870, during which the number of oil works increased from 6 to 90, was a period of rapid expansion. After 1870 American competition began to tell adversely on the Scottish industry, and later this competition was aggravated by the exploitation of the oil fields of the Caspian, Galicia, Burma, and other regions. In 1880 the number of Scottish works had decreased to 26, to 14 in 1890, and 9 in 1900, and now only 7 have survived in the struggle for existence at Addiewell, Broxburn, Pumpherston, Oakbank, Dalmeny, Philipstown, and Tarbrax.

The effect of this steadily increasing competition was a lowering of the retail price of refined burning oil from about 3s. 6d. during the period of Young's patent to 4½d. per gallon in 1911. But for the other substances in addition to burning oil contained in the shale, such as sulphate of ammonia, petrol, naphtha, tar, and the improvement in the machinery and the processes of production, the industry would ere now have been extinct.

Three million tons of shale are mined per annum, showing a rise of a million tons in the first decade of the twentieth century, producing 72 million gallons of crude oil, 75 per cent. of which was refined into finished products, and over 50,000 tons of sulphate of ammonia. "The advance in scientific technology," says Mr Cadell, "has led to such additional economies in the processes of manufacture that it is now possible, in spite of

many adverse conditions, to work profitably seams which used to be considered too poor to be of any commercial value. Indeed such is the recent progress in the scientific construction of the retorts that the shale is now made to distill itself with the heat derived from its own residual combustible gases, and no fuel is required except in the temporary process of starting new plant. The waste incondensible gases and tars produced are used for fuel at various stages, and electricity lends its wonderful help in different ways. All these economies have given much importance to the question of the future life of the shalefields, in which, no doubt, an immense quantity of oil—and ammonia producing shale of various qualities—still exists for future development."

" The companies," says a writer in *The Scottish Bankers' Magazine* of January, 1913, " employ in their mines and works fully 10,000 men, paying in wages £1,000,000 per annum. In addition, a large number of men are indirectly employed in the production of fuel, chemicals, and plant. . . . The total capital of the six limited liability companies, whose shares are publicly quoted, is approximately £1,670,000. . . . Last year's aggregate net profits amounted to approximately £165,000."

By the beginning of the nineteenth century the annual production of pig-iron was about 20,000 tons. At the end of the third decade of the century it had grown to about 37,000, whilst the number of furnaces had risen, during the same period, from 17 to 27. The invention of the hot blast by Mr Neilson, manager of the Glasgow Gas Works, in 1828, quickly multiplied production. This expedient consisted in heating the air before injecting it into the furnaces, and the substitution of the hot for the cold blast reduced the quantity of coke consumed in the smelting of one ton of iron from 8 tons $1\frac{3}{4}$ cwts. to 2 tons $13\frac{1}{4}$ cwts. Raw coal instead of coke was first used at the Calder Ironworks in 1831, and its use resulted in a further saving of fuel. This substantial reduction in the cost of production gave a great impulse to the industry. By 1836 the annual total of pig-iron had risen to 75,000 tons, in 1845 to 475,000, in 1855 to 820,000, in 1865 to 1,164,000, and in 1880, 1,049,000. The highest total reached within the period 1845-80 was 1,206,000 in 1870. It thus multiplied the number of smelting works, some

of which were established in the west of Fife as well as on the south side of the Forth. But it was in the west that the industry attained its full development. As early as 1786 the Clyde Ironworks had been established by Mr Cadell, one of the original partners of the Carron Company, in the parish of Old Monkland, and it was here that David Mushet, the discoverer of the "black band," and later Mr Neilson, the inventor of the hot blast, carried out the experiments that contributed so much to its development.

The most valuable deposits of ironstone are situated in Lanarkshire and Ayrshire, and it was in those districts, where in 1901 there were 79 furnaces in blast, that production was centralised. Most of the works were started between 1830 and 1840. The more important of those in Lanarkshire are at Coatbridge, Coltness, Govan, Tollcross (the Clyde Works), Carnbroe, Calder, Wishaw, Shotts; in Ayrshire, Glengarnock, Eglinton, Lugar, Dalmellington, Muirkirk, Ardeer. The largest are those at Gartsherrie, Coatbridge, belonging to Messrs Baird & Co., who were the first to apply the hot blast, and who also own the works at Eglinton and Lugar. Coatbridge, where those of the Summerlee and Langloan Companies are also situated, is in fact a town of blast furnaces. Besides pig-iron, bye-products such as tar and ammonia are obtainable by condensation of the gas given off by the coal, which is also used for heating the blast. Messrs. Baird were the first to erect machinery for this purpose in 1880.

"Blast furnaces, fairly familiar objects, are large, circular, tower-like erections. The interior, which is not straight in form, but contracts towards top and bottom, is lined with refractory fire-brick and ganister (a very refractory siliceous rock); around this is an annular space or ring filled with loose material to allow of expansion, and the outer wall of masonry is enclosed in iron sheathing strongly bound together. The furnaces range from 40 feet or so to 100 feet, and even more, in height, with internal capacity of 500 to 25,000 cubic feet or over. The modern furnaces are the highest, but it has been found that practical difficulties in working counterbalance the advantages of greater height when carried beyond a certain point. One advantage of

the higher furnace is to render previous calcining of the ore less necessary, the same effect being accomplished in the upper part of the furnace. At the top of the furnace is a gallery or platform from whence the charge is admitted. The mouth of the furnace is closed by means of a large cone, which can be lowered by a chain when the charge is being admitted and then closed again. The closed top is a modern advance. Formerly the mouth was open, and the great, lurid flames belching out made the blast furnace a picturesque feature of the district where it was erected. Many well remember the time when "Dixon's blazes," as they were familiarly called, formed a landmark in Glasgow; and when shipmasters on the Ayrshire coast could shape their course by the glare of the Ardeer furnaces. But the old order changes, and the picturesque has given way to the practical. The closed tops came into being when the gases generated in the blast furnace were utilised with resulting efficiency and economy . . . The charge consists of fuel, ore, and flux. The first is commonly coke, but may also be coal or a combination of both . . . The flux is commonly limestone, although other agents are also used. It is introduced in consequence of the impurities remaining in the ore. It combines with the silica and other prejudicial matter and forms a slag or cinder separated from the iron. A strong blast of air is introduced through piping surrounded by water tuyeres (outer casings). Powerful blowing engines force the blast into the furnace and through the charge therein. The water circulating through the tuyeres serves to cool the inlet where the heat becomes intense and might cause trouble by fusing the parts. . . . As the charge becomes affected by the intense heat, chemical and other changes take place, impurities being taken up by the flux, though some others partially remain, as sulphur, phosphorous, and carbon. After these changes, fusion speedily ensues, and the molten iron falls to the bottom, the slag floating on the top, while other waste elements escape in the form of gases. . . . At the bottom of the furnace is an aperture called a tapping-hole, kept closed till the melting of the iron is completed. A large bed of sand is formed in front of the furnaces in which channels are made with smaller furrows branching off from them. These

are called sows and pigs respectively, whence the term *pig-iron*, The tap hole being opened the melted iron runs out like a stream of liquid fire, flows down the large furrows into the smaller ones, where, on cooling, it assumes the familiar form of the oblong bars called pig-iron."

The diminishing supply of ironstone led to the importation of ore from Spain and other regions, which is landed at Glasgow or Ardrossan. About 115 million tons have been mined in Scotland, and though the total Scottish ironstone has been reckoned by Professor Louis as high as 8,000 million tons, only a relatively small portion of this vast quantity can be economically utilised. The bulk of the more valuable Scottish deposits is now, in fact, exhausted, and there has been a decline in the Scottish ore mined from well over 2½ millions in 1880 to over half a million in 1913. Recently, however, a large deposit has been discovered on the island of Raasay, Skye, from which the first consignment was shipped to Glasgow in 1911. On the other hand, the quantity of ore imported has risen enormously from about 42,000 tons in 1879 to nearly 1½ millions in 1899. Another reason for this importation is the need for pig-iron free from phosphorus for the manufacture of mild steel, for which the Scottish pig-iron is unsuitable. In 1900 the output of pig-iron amounted to 1,156,885 tons and was slightly below the total of 1865, but in 1910 it had risen to 1,427,828, and in 1913 to 1,369,259. The Carron Company, which still holds a foremost place in the industry and uses only the black band from its own mines, produces over 2,200 tons per week.

The Carron Works long held the pre-eminence in the manufacture of malleable iron and iron goods, though the making of cannon, for which they were famous, ceased about the middle of the nineteenth century. In 1819 a rival appeared in the Falkirk Iron Works, which were started by some enterprising workmen from the parent company, and developed into what was for a time the second largest foundry in Scotland. By the year 1880 there were 21 foundries in the district, which, with the Carron Works, gave employment to 6,000 men. Foundries also sprang up at Edinburgh, Leith, Dalkeith, Kirkcaldy, Dundee, and Aberdeen. At Carron, besides the famous "carronades," as the

small cannon were named, the articles manufactured were mainly those in domestic use, such as stoves, grates, cooking ranges, boilers, pots, rain pipes. At the Falkirk Works, which in 1848 passed into the hands of the Messrs Kennard, the products included the castings of iron bridges, such as the Solway Viaduct, and a large variety of artistically designed articles for practical or ornamental use.

With the development of the pig-iron industry the production of cast iron and malleable iron also shifted its centre to the west, many of the foundries being connected with the blast furnaces, though this connection ultimately ceased, and iron manufacture became a separate industry. Coatbridge is the chief centre of it, but Motherwell and Wishaw are good seconds. Before the substitution of mild steel for iron in shipbuilding and other industries, large forgings in the shape of plates, armour, shafts, etc., were produced, and it was to meet the necessity for a more serviceable instrument in forging huge products of this sort than the tilt hammer of James Watt that James Nasmyth, the engineer and son of the painter, invented the steam hammer in 1839. Cast iron is manufactured for castings, such as water and gas pipes. It is hard and brittle and cannot be welded or rivetted and is not pliable. Malleable iron, on the other hand, is ductile and fibrous and can be bent, twisted, welded, and rivetted. Its manufacture begins in the puddling furnace, in which the melting pig-iron is stirred or puddled by an iron rod, usually moved by the hand of the puddler, but in some works by mechanical means, until it attains a certain degree of consistency. The quantity of pig-iron, known as " a charge " placed in the furnace at one time, is about 5½ cwts., and the time occupied in puddling it is from two to three hours, so that five or six charges can be worked in twelve hours, the quantity of pig-iron used in the puddling of a ton of puddled iron being from 22 to 23 cwts. The charge is then conveyed in portions to the steam hammer, which expels the slag or dross and beats it into shape, the " shingler " turning it on the anvil between each stroke. It is then passed into the rolling mill to be drawn into bars. Thereafter it is cut into short lengths, and these are transferred to the " re-heating furnace " in the proportionate

number required for the manufacture of a specific bar, heated to the welding point, removed and rolled again, and finally cut by a circular saw to the required length. In the case of the finer quality of iron a second welding and rolling is added, gas furnaces of the Siemens type being now largely used in the reheating process. The work of the puddler and other skilled operatives is a very exacting and exhausting one, demanding close attention and great physical exertion.

The substitution of steel for iron has greatly limited the purposes for which iron is used. Nevertheless the quantity produced is still relatively large. In 1867 the number of puddling furnaces in operation was about 400, that of rolling mills 50, which produced 143,800 tons of malleable iron. In 1900 there was about the same number of furnaces at work at Coatbridge, Motherwell, and Wishaw, and the produce was 147,904 tons. The number of firms engaged in the industry was 22, owning 25 works.

"No new process having been introduced in the manufacture of puddled iron," says Mr Wylie, "the fundamental principles are just the same as have been in operation for the last 50 years or more, so that the only means of lowering the costs, in order to meet the keen competition of modern times, is by adopting from time to time all the minor improvements in furnaces and machinery, whereby the waste of material and consumption of fuel is lessened and the output increased, while the general wages and charges are reduced. In this respect the various works have not been slow in adopting any means which they considered would be a benefit to them in their respective branches."

The output of malleable iron is now far outdistanced by that of steel. Several attempts were made in Scotland in 1857 and the following years to manufacture steel by the Bessemer process, but the results were not satisfactory, owing to the unsuitability of Scottish pig-iron. In 1871 the Steel Company of Scotland was formed for the manufacture of steel by the Siemens, or acid open-hearth process, at Hallside, Newton, and up to the year 1879 this Company was the sole manufacturer of steel in Scotland. In 1878 its output had risen to about 42,000 tons, and two years later (1880) it acquired the Blochairn Works at St Rollox, Glasgow. In the previous year Mr Beardmore erected

furnaces at the Parkhead Works in the same city. From this date to the end of the century a considerable number of other works were established in Glasgow and the west. Among the largest are those of Beardmore & Co., the Steel Company of Scotland, David Colville & Sons, Motherwell; the Lanarkshire Steel Company, Flemington; the Glasgow Iron and Steel Company, Wishaw; the Glengarnock Iron and Steel Company; the Summerlee and Mossend Iron and Steel Company. In 1899 there were 115 open-hearth furnaces and the average number in operation during this year was 90. Already in 1883, the output had risen to 230,000 tons of ingots, yielding over 90,000 tons of plates, 85,000 tons of angles and bars, and 20,000 tons of sundry products. In 1900 the total of ingots was nearly 1 million tons, yielding 360,589 tons of plates and angles, 199,359 of bars, etc., and 56,839 tons of blooms and billets,—a total of 616,787 tons of finished steel. In 1912 the total of finished steel had swelled to nearly 1 million.

A corresponding advance has taken place in the equipment of the industry. In 1885 the largest smelting furnaces had a capacity of about from 15 to 20 tons. In 1900 it had risen to from 50 to 60 tons with a corresponding improvement in the appliances for handling such large quantities of molten steel. The old coal-fired horizontal furnace has been superseded by the vertical gas-fired regenerative furnace with cranes of various type for charging and drawing the ingots. The steam hammer has been displaced by the modern slab cogging mill, with the necessary appliances, worked by hydraulic power, and capable of turning out from 60 to 70 tons of steel per hour. The plate and bar mills have been similarly equipped. Such appliances have become a necessity in view of the largely increased size of steel slabs and plates, with the result of lessening the strain of manual labour and effecting economy in production.

Some firms like the Messrs Beardmore and the Messrs Brown combine steel production with shipbuilding, and are capable of building and equipping the largest warships and other vessels from their own resources. Many other firms are engaged in one or other of the branches of mechanical engineering, such as iron and brassfounding, boilermaking, machine toolmaking, the mak-

ing of sugar machinery, locomotives, motor cars, textile machinery, sewing machines, agricultural implements and machinery, electrical plant, sanitary, lighting, and heating appliances. Not a few of them occupy a leading position in their specific industry and send their products all over the world. The North British Locomotive Company of Glasgow, for instance, sends locomotives to India, Japan, South Africa, America, and elsewhere, and formerly to Germany. It employs between 7,000 and 8,000 men, and turned out in 1911 7,346 locomotives. In the same year the Caledonian Railway Company's Works at St Rollox completed 2,758, the North British Railway Company's Works at Cowlairs 2,351, and those of the Glasgow and South-Western Railway at Kilmarnock also 2,351.

4. Shipbuilding and Marine Engineering

The Clyde Valley is richly endowed with the mineral requisites of the great development in shipbuilding and marine engineering, which forms one of the most striking features of Scottish industrial history in the nineteenth and early twentieth centuries. It possesses or is within easy reach of vast stores of coal. Iron ore, too, is at hand, and what nature has withheld—an adequate waterway—has been provided by the deepening of the river which affords easy access from the sea for the import of this ore and also of copper ore from Sweden, Spain, and other countries. The smelting and rolling works on or near its banks are there to manufacture these raw products. This concentration of coal, iron, and steel, backed by engineering skill and native energy, has given the Clyde its pre-eminence in the shipbuilding industry. These advantages do not, of course, apply to that part of the nineteenth century when wood was used in ship construction, but even during this period the Clyde shipbuilders were among the leaders of this industry, and the advantage of having a waterway, which had been made accessible to deep sea vessels, told in their favour when the use of wood ere long gave way to that of iron and steel in shipbuilding and the internal resources of the Clyde valley came into play with remarkable results. The

enterprising spirit of the Clyde builders and engineers, which has been quick to apply every advance in naval architecture and engineering, has also played an important part in maintaining their supremacy. "They have been associated," says Mr Pollock, "with practically every scientific advance in naval architecture for the last century. Through all the transitions—wood to iron, iron to steel, paddle to single screw, single screw to twin screw, twin screw to multiple screw, turbine engines—Clyde shipbuilders have been to the front with exemplar ships." It was not without good reason that the late Sir W. White described the Clyde as "the premier shipbuilding river."

The Clyde is, of course, no longer exclusively the great shipbuilding centre in Britain. The development of the industry has been equally remarkable in the North of Ireland and the North-East of England. But in variety of work it is supreme. "Variety," says Mr Macintyre, "distinguishes the industry on the Clyde above all others. The operations of its builders are not restricted to the production of one or two or three types. The building of everything that may be called a ship has been undertaken at any cost, and when you speak of Clyde shipbuilding, you speak of the whole range of naval architecture."

"It is impossible," says another writer in the *Scottish Bankers' Magazine* of October 1912, "to estimate the capital value of the Clyde shipbuilding yards with any degree of accuracy, but the amount has been roughly stated at £30,000,000. In point of equipment they are the finest in the world, and their chiefs are the Gamaliels at whose feet all other shipbuilders and engineers of the world sit and learn. All the Cunarders were built at Glasgow; and with perhaps one exception the other great steamship companies patronise the Clyde, while the Admiralty is a constant and most lucrative stand-by."

The development of the steamship in Scotland is traceable, as we have noted, to the engineer Symington, who first applied steam to ship propulsion in the *Charlotte Dundas*, and whose experiments were made use of in the construction of the first Clyde steamer in 1812. Bell began life as a stone mason, and in 1783 took up the trade of a millwright along with his uncle. Some years later he worked as a ship modeller at Bo'ness and

thereafter migrated to London, where he served under Rennie, the engineer. In 1790 he started business as a carpenter at Glasgow, and in 1807 removed to Helensburgh, where his wife carried on a hotel and where he devoted his leisure to the problem of applying steam to navigation, which had engaged his attention since 1786. The lack of financial support long delayed the exemplification of his ideas, and it was not till 1812 that they at last took practical shape in the *Comet*. He was anticipated by Robert Fulton, whose father had emigrated from Ayrshire to America, and whose paddle boat, the *Clermont*, began to run on the Hudson in 1807. Fulton as well as Bell was, however, indebted to Symington, for both of them had inspected the *Charlotte Dundas*. The *Comet* was built by John Wood, Port-Glasgow, and engined by David Napier. It was 42 feet long, 11 feet broad, with a draught of 5½ feet, and was driven by a three-horse power engine. It plied between Glasgow, Helensburgh, and Greenock, and even made the voyage up the west coast as far as Oban. Her inventor did not derive much financial benefit from his venture, and died in 1830, a poor man in receipt of an annuity of £100 from the Clyde Trustees.

During the next 10 years 48 steamers, showing a steady increase in size and horse power, had been constructed in Clyde yards. One of these, the *Marjory*, built by W. Denny, Dumbarton, in 1814, was the first steam vessel to ply on the Thames. In the same year three were built at Dundee and engined by John Robertson of Glasgow, and two of them were employed on the Humber. In 1815 the *Britannic*, of 109 tons and 32 horse power, ventured on the voyage to Campbelltown, and from 1818 plied between Glasgow and Londonderry. From the Clyde yards came, too, the steamers which ere long traded between Glasgow and Belfast, Glasgow and Liverpool, Holyhead and Dublin, Leith and London. For the last mentioned service, the *United Kingdom* was built by Steel & Co., of Greenock, in 1826, and with her length of 160 feet, beam of 26½ feet, and 200 horse power Napier engines, was the marvel of the time. Fully ten years later the *Sirius*, built by Menzies & Son, Leith, and engined by Wingate & Co., Glasgow, though not much larger (170 feet in length, 450 tons, and 270 horse power) was the first Scottish

built vessel to cross the Atlantic, starting from Cork in 1838 and doing the voyage in eighteen days.

The substitution of iron for wood in steamship construction brought into play the natural resources of the Clyde. The first boat to be constructed of this material in Scotland was the *Vulcan*, built by Thomas Wilson at Faskine on the Monkland Canal in 1817-18 and used for passenger traffic by the Forth and Clyde Canal Company from 1819 onwards. Its construction exposed the builder to the jeers of the bargemen, on the assumption that iron could not float, but the *Vulcan* ere long disarmed their scepticism. It was not, however, till 1831 that Neilson produced, in the *Fairy Queen*, the first iron steamer at the Oakbank Foundry, Glasgow, whence it was carted to the Clyde and launched at the Broomielaw. It was followed by the *Royal Sovereign*, built by Tod & MacGregor and launched in 1839 for service between Glasgow and Liverpool. Tre *Royal George* and the *Princess Royal* by the same builders followed soon after. The iron steamer did not for long, however, displace the sailing ship, and for a time the composite ship with inner iron frame and wood sheathing was in favour, especially in the East India and China trade, for which the famous tea clippers were constructed. The first to build this type of vessel on the Clyde (1862) was Alexander Stephen, one of the founders of the famous Linthouse firm. One of the most remarkable of these clippers was the *Thermopylae*, which was built by Hood & Co., Aberdeen, in 1868, and in 1870 made the voyage from London to Melbourne in sixty-one days.

The founding of the Cunard Company in 1840, for the purpose of maintaining a regular steam service to America, gave a great impulse to Clyde steamship building. The first of its fleet, the *Britannia*, built by Robert Duncan, Port-Glasgow, and engined by R. Napier, measured 207 feet by 34, with a tonnage of 1,154, and a speed of 8½ knots. It was followed by the *Acadia*, *Caledonia*, *Columbia*, of the same dimensions. These vessels were still wood built, and were surpassed by the iron steamer *Great Britain*, completed at Bristol in 1844 for the Great Western Steamship Company, with a length of 325 feet and a tonnage of 3,433. The *Great Britain* was a screw steamer, and the sub-

stitution of the screw propeller for the paddle wheel marks another great advance in steamship construction. The Inman Company, established in 1850, as a rival of the Cunard for the Atlantic trade, started with two screw-propelled iron steamers, the *City of Glasgow* and the *City of Manchester*, each of 1,680 tons burden and 350 horse power. This competition led the Cunard Company not only to adopt iron in the construction of their new mail vessels from 1855 onwards, but in 1862 to discard the paddle for the screw propeller in the *China* and four other vessels built during the next two years. These vessels conclusively proved the superiority of screw over paddle propulsion in speed and economy. "Situated as it is at the stern of the vessel and fully immersed, the screw acts upon relatively a much larger volume of water in a given time than paddle wheels, and its efficiency is not impaired by the rolling and pitching motions of the vessel or completely nullified by variations in the ship's draught of water as with paddles." Twin screw propellers and duplicate engines followed in due course in deference to the need for greater size and speed and also greater safety. Among the earlier vessels to be fitted with these improvements were the *City of New York* and the *City of Paris*, built at Clydebank for the Inman Line and put on the Trans-Atlantic service in 1889. The effect was speedily seen in the marked reduction of the passage across the Atlantic. During the previous fifteen years the duration of the passage had gradually been reduced from between seven or eight days by the new and ever larger vessels of the various Atlantic lines, many of them, like the Cunarder *Umbria*, Clyde-built. The latter had by the year 1888 reduced the time to 6 days 1 hour and 55 minutes for the outward and 6 days 4 hours 36 minutes for the homeward voyage, with an average speed of 19½ knots. In the following year the *City of Paris* attained the record of 5 days 19 hours 18 minutes for the outward voyage, or an average of over 20 knots. The Cunard Company took up the challenge, and in 1893 the record was further reduced by the Fairfield-built *Campania* and *Lucania*, each with a tonnage of 12,950 and an indicated horse power of about 28,000; and these vessels ultimately (1894-95) did the voyage between Queenstown and New

York in 5 days 9 hours and 6 minutes and 5 days 7 hours and 23 minutes respectively.

By this time mild steel had largely displaced iron in steamship building. Here again the Clyde took the lead, Messrs W. Denny & Brothers, Dumbarton, producing in 1879 the first ocean-going steel steamer for the Union Steamship Company of New Zealand, and a second for the Allan Line in the following year. These were followed by the *Parisian*, built by R. Napier & Sons, Govan, for the same Line, and a number of other companies, including the Cunard, with the *Servia* in 1880, turned to the Clyde yards with orders for steamers of this material. Progress was at first retarded by the greater cost of steel compared with iron, but this drawback disappeared with the increase in production and the progress in its manufacture, until it became cheaper as well as much more conveniently obtained than iron. Its use has now become almost universal in ship construction, " nickel steel " (steel alloyed with a percentage of nickel) being the favourite variety.

This growth in size and speed was only rendered possible by a corresponding advance in marine engineering. In this connection the work of John Elder, the great marine engineer, and the founder of what ultimately became the Fairfield Shipbuilding and Engineering Company at Govan, is highly important. Elder successfully applied in marine engineering the idea derived from James Watt of using steam in two cylinders successively so as to increase its motive power. He designed and constructed in 1854 the first compound in place of the single acting engine, which was effectively used in steam navigation in the case of the screw steamer *Brandon*. He thereby reduced the consumption of coal by from 30 to 40 per cent. By steam jacketting the cylinders (an idea also derived from Watt) he further reduced the coal consumption more than half. This reduction was a convincing argument with shipowners in favour of the adoption of this type of engine for long distance steamers, for some of which it had hitherto proved impossible to provide sufficient coal for the distance to be travelled. The reduction of the coal bill was an equally forcible argument in its favour. The addition of the surface condenser (which had also been suggested by Watt),

fitted into the *Royal Bride* in 1858, was another distinct advantage, inasmuch as it did away with the use of sea water, which had proved detrimental to the boilers. Mr Elder also took out a patent for triple and quadruple expansion engines, but it was only after his death in 1869 that this development took place as the result of the combined efforts of Mr Taylor of Newcastle, Dr Kirk of Napier & Sons, Govan, and Mr Brock of Denny & Co., Dumbarton. The introduction of the triple expansion engine in 1886 and the quadruple in 1896 tended to reduce further the coal consumption and made possible the adoption of the triple and even the quadruple screw propeller. The water tube boiler, whose successful use the substitution of mild steel for iron made possible, came in due course, the Babcock & Wilcox and the Yarrow types receiving the recommendation of the Boiler Committee of the Admiralty in 1904. The turbine or rotary engine, as a substitute for the reciprocating engine, invented by the Hon. C. A. Parsons and successfully applied in the *Turbinia* in 1894, was described by Lord Kelvin as the greatest advance in steam engine practice since the days of Watt.

As the result of the advantages in speed and economy exemplified by this vessel and two destroyers fitted with turbines, W. Denny & Brothers, Dumbarton, built two turbine steamers, the *King Edward* in 1901 and the *Queen Alexandra* in the following year, for service on the Clyde estuary. The former developed a mean speed of 20½ knots on the measured mile and of 19 knots on a coal consumption of only 18 tons per day on the voyage to Campbelltown and back—a distance of 160 miles. The *Queen Alexandra* improved on this with a mean speed of 21.63 knots. The same firm constructed a number of turbine steamers for the cross-Channel service, and in 1904 completed several others for the New Zealand Union Steamship Company and the British India Steam Navigation Company. In the following year Messrs. Stephen & Sons launched the *Virginian* for the Allan Line. After exhaustive investigation the Cunard Co. decided to adopt the turbine for their new liner the *Carmania*, of 21,000 tons, built by J. Brown & Co. at Clydebank in 1905. This vessel was surpassed in size and speed by the *Lusitania* and the *Mauretania*,—the former built at Clydebank—

which in 1910 wrested from the North German Lloyd, *Kaiser Wilhelm II*, the lost record for the Atlantic passage with the astounding performance of 4 days 10 hours 41 minutes from Queenstown to New York. The Clyde record for size, if not for speed, was produced by the same firm in the *Aquitania*, launched in 1913 with a tonnage of over 50,000. In 1911 out of the Clydebank total of 104,550 horse power, 71,000 consisted entirely of turbines and 11,250 of combined turbines and reciprocating engines. The figures for Fairfield were about 44,000, Dumbarton about 80,000, Dalmuir 40,500, Govan 22,000, Scotstoun 28,000.

A still later development is the oil (internal combustion) engine and the motor ship, not to speak of the airship, in which Messrs Beardmore have specialised during the war with remarkable results, such as the air leviathan which recently (summer of 1919) performed the voyage from Drem to America and back to Norfolk without mishap. The substitution of oil for coal in ship propulsion was applied in the *Selandia*, built at Copenhagen in 1912 and supplied with Diesel engines. It was strenuously advocated by the late Lord Fisher and promises to become general, the cost of oil compared with coal being considerably less. The latest motor ship, the *Narragansett*, has a displacement of 14,000 tons, is fitted with two Diesel engines on the standard four-stroke system, carries 700 tons of oil fuel, and burns 11 tons per day.

These engineering improvements have revolutionised the art of ship construction, which has attained a development and a variety of type far beyond the dreams of our forefathers. "The single screw cargo steamer, driven by reciprocating engines," says a writer in the *Glasgow Herald Supplement* for December 31, 1912, "still predominates in numbers and in tonnage; but with the adaptation of the turbine, by means of gearing, to low-speed propellers, and with the coming of the oil engine as a serious competitor in the propulsion of ships, it is difficult to say how long it will be able to retain its present position. But the variations in types of vessels built now extend much further than the distinctions between types of propelling machinery. Specialisation in the designs of hulls for different trades is being carried to great lengths. There are far more kinds of 'screw

steamers ' than there used to be; special service vessels have become floating workshops and laboratories, colliers have become independent of quay equipment, oil tankers are coming to be commonplace; the ' clear hold ' boat is rapidly superseding the vessel of pillars and stanchions, and—to come back to motive power—there are now motor passenger ships, motor cargo ships, motor coasters, barges, lighters, tugs, yachts, and launches, as well as motor gunboats and at least one motor destroyer. There have never been so many types of vessels as at present, the types have never been so well adapted for their particular purposes, and—paradoxical though it may seem—there has never been a time when shipbuilders and engineers were more capable of turning out vessels that could be used profitably on any of quite a number of different services or routes."

Size and speed, combined with safety, economy, and increasing luxury have been the distinctive features of the remarkable evolution of the passenger steamship during the last sixty years. The paramount consideration of safety has led to the adoption of the double bottom and the water-tight bulkhead and the installation of the Marconi wireless on all ocean liners. The evolution has not even yet reached its limit in view of the possibilities of liquid fuel, gas, and electricity in propulsion. In the case of combined passenger and cargo steamers size rather than great speed has been one of the dominating factors, and has given rise to the " intermediate " steamer, of which the Clyde has produced many magnificent examples in recent years for the various steamship companies, and which combine large carrying capacity with moderate pace.

The Clyde was long famous for its sailing ships; but the proportion of steam to sailing ship tonnage has gradually declined, though there have been occasional revivals. Between 1890 and 1893, for instance, there was a burst of activity in this kind of construction and in the four years ending in 1894 five of the Clyde firms built 185 sailing ships aggregating 842,528 tons. Since then, however, there has been a marked falling off and such revivals are not likely to occur in the future.

Clyde shipbuilders have contributed many war vessels to the British Navy, and to describe what they have accomplished in

this department would be to write a very long chapter in the history of British naval construction. John Brown & Co. contributed a number of the larger battleships and cruisers in the closing years of the nineteenth century, such as the *Ramilies*, the *Jupiter*, the *Terrible*. In the opening years of the twentieth they added to their list of battleships and cruisers the *Hindustan*, *Inflexible*, *Australia*, *Tiger*, *Repulse*, and the Dreadnought *Barham*. In 1919-20 they produced the largest and most powerfully armed battleship in the world in the *Hood*, of 41,200 tons and 31 knots, which cost £5,610,568—perhaps the last of the naval leviathans—in view of the probable change in naval policy and construction as the result of the war. The Fairfield Company has also attained prominence in warship building in recent years with such battle cruisers as the *Indomitable*, which made the warship record in crossing the Atlantic in 1908, the *New Zealand*, and the battleships *Valiant* and the *Renown* of 28,200 tons in 1916—a vast advance upon the *Nelson* of 6,000 tons, contributed by the same yard in 1878. The record of Beardmore & Co. during the same period, who took over the business of Napier & Sons, Govan, in 1900 and added a new yard at Dalmuir, is also a formidable one, with the *Berwick* and *Carnarvon* in 1902-03, the *Agamemnon* in 1906, the *Gloucester*, *Falmouth*, *Conqueror*, *Benbow* from 1909-13. During the years of the war these and other firms completed large additions to the Navy, war work largely taking the place of mercantile construction, which space forbids to give in detail. The Clyde, it may be fairly said, rendered yeoman service in winning the war as far as the extension and maintenance of the British fleet was concerned and the provision of numerous Clyde-built vessels as transports or armed cruisers for government service.

Besides the building of ships a number of Clyde firms have large engineering works for the production of the boilers, engines, etc., fitted into them. Brown & Co., Beardmore, Fairfield, Denny, for instance. Details are impossible. Suffice to say that in the last three years of the nineteenth century the engines produced on the Clyde reached a total indicated horse power of nearly 1½ millions. In 1912 Messrs Brown reached a record in the total for the world and also by one firm in a single year with

178,500, and the figures for the whole Clyde, 878,000, also constituted a record. In the following year the latter record was broken with 1,111,400. During the four and a half war years the same firm's total alone was well over 1½ millions.

At present there are about 50 firms engaged in this industry on the Clyde and its estuary, including Harland & Wolff of Belfast, who have established works at Glasgow and Greenock, and in total annual tonnage they lead not only the United Kingdom, but the world. The total fluctuates with the years, according as the demand for new shipping rises or falls. Taking the last five decades from 1862 to 1912 it shows, with one exception, a steady rise, though there are ebbs and flows in the individual years of each decade. From 1862 to 1872 the total rose from 69,967 tons to 230,347, in 1882 to 391,934, in 1892 it fell back to 336,514; rose again in 1902 to 516,977, and in 1912 to 640,529. In the following year, 1913, this total was surpassed with 692,600, and including warships, 756,800. In 1920 it was 671,915. Of the individual firms Russel & Co., Port-Glasgow, headed the list with 71,224 tons in 1912, Scott following with 58,314, Connell with 45,314, Barclay, Curle with 41,750, Hamilton with 40,029, Fairfield with 36,626, Caird & Co. with 35,936, Denny with 33,925, whilst Stephen, Henderson, McMillan, Brown, and Beardmore ranged between 29,000 and 20,000. It is noteworthy that as long ago as 1890 Russel & Co. exceeded the 70,000 somewhat—the largest output for the world in that year. The firm again held the world record in 1904 with nearly 74,000 and in 1914 it improved on this with over 78,000. The firm has recently been reconstituted under the name of Lithgows and in 1920 appears third on the list of output, Harland & Wolff being first with 69,905 tons, Barclay, Curle second with 60,132, Fairfield fourth with 40,234, Brown fifth with a few tons less, whilst Connell, Denny, Scott follow with 33,570, 30,499, and 30,000 respectively, and Henderson, Ayrshire Dockyard, Stephen, Hamilton, Duncan, McMillan range between 30,000 and 20,000.

In the face of these figures the output in the east coast yards is very modest. On the Forth, Tay, Dee and Moray Firth only relatively small vessels are built, and the figures for 1912 were respectively 19,054, 17,388, and 11,217 tons.

"In busy times," remarks Mr Pollock, "the largest of the combined ship and engine establishments of the Clyde employ each from 5,000 to 6,000 workmen, a large proportion of whom are skilled artisans. Altogether the shipbuilding and engineering works of the Clyde—including various subsidiary, but closely connected branches—afford employment to between 60,000 and 80,000 workpeople, the number varying of course between these limits with the general condition of trade. The average annual output of the Clyde shipyards (as measured by tonnage and including warships) excels that of the whole of the United States, and almost equals the total production of both Germany and France . . . Of the 60,000 or 80,000 workers, considerably over three-fourths in the shipyards are journeymen and apprentices; the remainder being artisan helpers and unskilled labourers. In the engineering works, due to the growth of automatic devices, the proportion of apprentices and youthful attendants of machine tools to the skilled workers is very much higher. A score or more of distinct trades, however, are involved in the building and equipment of ships. Prominent among them are frame-setters, platers, hole-borers, rivetters, caulkers, drillers (familiarly referred to as "the black squad"), shipwrights, joiners, cabinet-makers, plumbers, blacksmiths, tinsmiths, brass and copper workers, painters and riggers ("the white squad"), pattern-makers, and steam, electrical, and hydraulic engineers—the latter further sub-divided into "machinists," "fitters," etc., according to the particular line of occupation in the engine-shops."

5. The Textile Industry

As previously noted, homespun cloth was made in the homes of the people throughout Scotland for centuries. In the course of time Waulk mills were established for the purpose of fulling the cloth, the process being done much better by beating wet, soapy cloth mechanically than by tramping it by the feet. Another stage in the process of woollen manufacture is marked by the substitution about the beginning of the nineteenth century for hand cards of machine cards driven by water power.

To meet the growing demand for yarn, the hand mule was devised; the power loom gradually displaced the hand loom, and this revolution in the weaving industry reacted on the spinning industry and led to the evolution of the self-acting mule. It is on these and other improvements of machinery that the development of the textile industry rests, and though Scotland cannot claim their invention, its manufacturers have applied them with remarkable results, and some of them, like Mr Melrose of Hawick, who invented the piecing machine, and Mr Roberts, who started the first successful feeding machine or condenser in Scotland, have a share of the credit of them.

The famous tweed cloth derives its name from the inadvertent reading of tweed for " tweel " by the clerk of a London merchant in an invoice of goods, consigned by a Hawick manufacturer in 1826. By this happy mistake the name of the region, which has long been the centre of the industry, passed to the cloth manufactured in the towns on the Tweed and its tributaries. That the woollen manufacture should have taken a firm hold in this region is largely due to the fact that it rears a large number of sheep and thus provides a supply of wool, which in the earlier days of the industry was fairly adequate to the demand, though it has long ceased to be so. Jedburgh claims the distinction of being the first town to produce this cloth by the simple expedient of twisting together two or more woollen yarns of different colours. But Galashiels early took the leading place in the industry, with Hawick as a good second. From Galashiels Mr Henry Ballantyne transplanted it to Walkerburn, where there was a plentiful supply of water power and cheap land. Another motive for this extension was the fact that the Galashiels weavers were an independent set of men, working only from Tuesday or Wednesday to Saturday and drinking or fishing on Monday and sometimes even on Tuesday. The sons of Henry Ballantyne migrated to Innerleithen and later to Peebles, and now nearly the whole industry in the Tweed valley is controlled by his grandsons. Its rise in Selkirk was largely due to incomers from Galashiels during the " nineties."

The wool supply comes mostly from British Colonies and South America. It is prepared for the carding machine by

machinery invented and improved for the purpose, by which it is scoured, dried, teased, and oiled. After carding it is spun into yarn, dyed, woven, fulled, stretched, cropped, and pressed into the finished article. This intricate process is accomplished by appliances which have long displaced the primitive methods of the days of the spinning wheel and the hand loom.

In the process of manufacture tweed retains the natural strength of the material unimpaired and does not sacrifice this quality to fineness of fabric or perfection of finish as in the case of English or Continental cloths. The best testimony to its excellence is the fact that the Scottish manufacturers have found many imitators in England and on the Continent and have had to face the competition of English made "Scotch tweeds." In the best qualities they, nevertheless, take the lead, and this imitation was adduced by the jurors of the Exhibition of 1862 as a proof of the supremacy of this department of Scottish industry. "To the Scotch manufacturers belongs the credit of having found out what the public like, and of having led for a considerable period the public taste. So largely have their productions been imitated on the Continent, that many of the choicest fancy trouserings of France and other countries are easily traceable in design and colouring to their Scotch origin."

The tweed manufacture dates from the first quarter of the nineteenth century, when the old Galashiels "tweels" (greys, blues, and drabs) gave place before the demand for a more varied cloth. Sir Walter Scott, when Sheriff of Selkirkshire, had done something to foster this demand by wearing a pair of trousers made of Scottish checked plaid, and the commercial collapse of 1829 induced the manufacturers to attempt a new departure in the woollen industry. In this year there were only fifteen sets of carding machinery in operation. Fully twenty years later, in 1851, the number had swelled to 225, while the number of factories was 72, operating 329 power looms and producing goods of an estimated value of £900,000. By 1869 there were 85 factories with 340 sets of carding machines, 2,720 power looms, giving employment to 13,600 persons, while the value of the cloth produced had risen to over two millions.

The industry had then and still has its centre in the Border towns—Galashiels, Hawick, Jedburgh, Earlston, Innerleithen, Selkirk, Peebles, Langholm—but it has extended to other places, such as Dumfries, Bannockburn, Pitlochry, Aberfeldy, Aberdeen, Inverness, Elgin, Keith. To Aberdeen belongs the distinction of possessing the largest tweed mill in Scotland—that of Messrs Crombie at Woodside, which gives employment to over 1,500 hands in the highest class coating trade. At several places where mills were established—Stirling, Cambusbarren, Menstrie, Kinross,—the industry has died out. Highland tweeds enjoy a well-merited reputation, and the industry still affords employment to the home worker in the Highlands and Islands, Harris tweeds being the favourite garb of the sportsman. Galashiels has maintained the leading position in the industry. In 1861 its population was about 6,000; in 1896 the total had grown to 19,000. In 1900 it had fallen, however, to 18,500, to rise again in 1911 to 15,000. The industry has thus its vicissitudes in accordance with the law of supply and demand, though it has on the whole been progressive. The same fluctuation is observable in the case of Hawick, which about 1890 almost rivalled its neighbour in production. Between 1895 and 1910, however, half its weaving mills were closed and more than half its spinning power disappeared. But, unlike Galashiels, it is not a "one trade town" and has developed valuable knitting and dyeing industries. The total of carding machines and power looms employed in the Border towns was about 300 and 3,000 respectively in any ordinary busy year previous to the war, with an output valued at £3,000,000.

Besides tweed the Scottish woollen industry embraces the manufacture of a large variety of woollen goods—yarns, flannels, blankets, hosiery, shawls, tartans, wincey, carpets, bonnets, etc. In addition to the towns mentioned in connection with the tweed manufacture, spinning or weaving mills for the production of these articles, or some of them, were established at Alloa, Tillicoultry, Alva, Edinburgh, Dalkeith, Bonnyrig, Roslin, Glasgow, Paisley, Kilmarnock, Ayr, and several other places, where the industry has remained on a very limited scale or has died out. Hawick acquired the lead in the hosiery industry, and Hawick

underwear has a world-wide reputation. From 400 to 500 Cotton patent frames, employing 3,500 workers, and each producing six garments at once, of the finest quality and texture for the most part, were at work in 1915. In carpet making the lead is still taken by Kilmarnock, with Glasgow, Paisley, Ayr, Bannockburn, and Aberdeen as important competitors. At Edinburgh, on the other hand, the industry has almost become extinct, though patent tapestry was invented by Mr Richard Whytock, who in the earlier part of the nineteenth century occupied a leading position in the trade. About the same time Mr Newton of Kilmarnock invented the three-ply Scottish carpet and also improved the machinery for its manufacture. Another advance was made by Mr Templeton of Glasgow with the Patent Axminster, and to him belongs the additional merit of being a pioneer of artistic manufacture. He employed the best designers and the most capable workmen available, and he persevered in the face of old-fashioned prejudice till success, both artistic and commercial, was attained. One of his triumphs was the winning of one of the two gold medals awarded at the Paris Exhibition of 1868 to British carpet manufacturers. Brussels and Wilton were also introduced, and ere long came the Jacquard machine. To this development the Board of Manufactures rendered great service by fostering the inventive spirit by means of premiums.

Kilmarnock and its neighbourhood are also the centre of the bonnet making industry, and hosiery is extensively produced. Paisley was once famous for its shawls, in the making of which its hand loom weavers found at least a temporary remedy for the long years of depression that supervened on the Napoleonic wars, which forced many of them to emigrate. These products were remarkable for their artistic design and workmanship. "As craftsmen the Paisley weaver and his assistant 'draw boy' of these early days have never been equalled in textile skill." But their popularity passed with the change of fashion, and the intervention of Queen Victoria, who used her influence in 1842 in a well-meant attempt to revive it, was only temporarily successful. Hand loom weaving was doomed in the struggle with the power loom and the factory system, though the hand loom

weaver lingered long in the district, and even yet he is employed in the making of certain fabrics.

In 1878 the total number of woollen factories in Scotland was 246, employing fully 22,500 workers of both sexes. In 1890 there were 85 spinning and 48 weaving factories, 118 in which both spinning and weaving were carried on, and 31 described as unenumerated, with a total of fully 31,000 employees. In addition there were 20 spinning and weaving factories engaged in the worsted trade and employing about 6,000 hands.

The industry has been greatly benefitted by the establishment of the South of Scotland Central Technical College at Galashiels which, under the direction of Dr Oliver, serves the purpose of a Woollen School for Scotland. It is the only institution in Great Britain devoted solely to instruction in the principles and practice of fancy woollen and worsted cloth manufacture, textile testing, fibre analysis, dyeing, colour, mechanics, physics, machine drawing, and in art, chemistry, and electricity as applied to the industry. Attached to it is accommodation for 60 hand looms for the use of the students in experimental weaving and designing, 6 power looms, warping, warp and weft winding, a set of woollen cards with the different feeds and condensers, mule, twisting frame, knitting machines, and smaller apparatus. The funds for the scheme were raised by public subscription supplemented by a grant of £10,000 from the Scottish Education Department.

In the first quarter of the nineteenth century the linen industry had its centre in the counties of Fife and Forfar. In 1822, the last year in which the linen stamp law was in force, Forfarshire produced fully 22⅔ million yards, Fifeshire nearly 8 million yards out of a total of 86¼ millions for the whole of Scotland. Two other counties, Aberdeen and Perth, produced fully 4 millions of the remainder. The Board of Manufactures encouraged the industry by offering premiums for its improvement and up to 1832 by granting bounties to the manufacturers. In 1807, for instance, premiums were awarded for the best and second best samples of plain linen, diaper, shirting, etc., three of them going to Dunfermline and two to Edinburgh. Forfarshire owed its early preeminence in the industry also to the fact that its soil

was specially well suited for the production of flax, and its spinners and weavers thus obtained a ready supply of the raw material which is now imported from foreign countries. Besides Dundee there are factories in all the considerable towns of the county, including Forfar, Brechin, Montrose, Arbroath, Kirriemuir. In 1822 there were already in Dundee and its neighbourhood 49 flax spinning mills driven by steam power. By the middle of the century the number had grown to nearly 40 in Dundee alone. The first power loom factory was erected by Messrs Baxter in 1836 and others followed ere long. The progress of the industry during the first half of the century may be gauged from the fact that the quantity of flax, hemp, and tow imported into Dundee rose from 2,187 tons in 1815 to 47,113 tons in 1853. The jute manufacture ere long displaced that of linen from first place, and in 1892 the imported flax and hemp had fallen to about 21,000 tons. In 1911 the total, including tow, was slightly below 20,000. Dundee, in addition, produces a large quantity of textile machinery valued at about £300,000 a year and giving employment to between 3,000 and 4,000 artisans. The cognate industries of bleaching, dyeing, and calendering are also extensive.

Arbroath owed the rise of its linen industry to the accidental discovery by one of its weavers of the Osnaburg linen cloth in 1788. The industry throve exceedingly and before the end of the century its weavers produced over a million yards of linen, besides sail-cloth of almost equal value. The introduction of spinning machinery in the beginning of the nineteenth greatly increased the output, and by 1832 there were 16 spinning mills in the town and neighbourhood. Ten years later several more had been added and the flax annually spun amounted to 7,000 tons. In 1875 the spinning and weaving mills numbered 34 with 40,000 spindles and fully 1,100 power looms, with a weekly output of almost 45,000 yards of linen. In 1907 the value of the flax imported was nearly £150,000.

Steam driven flax spinning machinery was first introduced in Ford's mill at Montrose in 1805, with George Stephenson, of subsequent locomotive fame, as engineman, and flax spinning has remained its chief industry, the value of the flax imported

in 1906 being £267,000. From Montrose Forfar obtains a large part of the yarn for its weaving factories. Brechin has two spinning mills as well as five weaving factories for the manufacture of Osnaburgs, brown linens, and sailcloth. In the early part of the century the industry was so extensively carried on at Kirriemuir that it was second only to Dundee in production, and its output is still extensive. Hand loom weaving lingered long here, and one of these weavers, David Sands, acquired notability in the second half of the eighteenth century as the inventor of a mode of weaving double cloth for the use of staymakers, and for seamless shirts. The neighbouring Blairgowrie and Alyth, though in Perthshire, and Coupar-Angus, have also a considerable linen industry.

In Fife the industry is carried on at Dunfermline, Kirkcaldy, Dysart, Leslie, Leven, Auchtermuchty, Kingskettle, Ladybank, Strathmiglo, Falkland, Cupar, Tayport, Newburgh, and several other places. The damask of Dunfermline is unequalled in design and finish and its artistic fame is traceable to Mr Joseph Paton, father of the celebrated painter. Its manufacture dates from the early part of the eighteenth century, when it was introduced by James Blake, who had learned the secret in a workshop at Drumsheugh, near Edinburgh, and started the first damask loom in his native town. Improvements in the damask loom were subsequently made by John Wilson and David Bonnar, and a great impulse was given to the industry by the introduction of the Jacquard machine in 1825. "The beautiful specimens of damask made in Dunfermline, Belfast, and other places," says Mr Warden in his *History of the Linen Trade*, "are now chiefly produced by the Jacquard machine, invented by Joseph Marie Jacquard, and first shown at the National Exhibition of Industry, held at Paris in 1801. This very perfect, but simple machine was at first received with much bad feeling by the artisans of France, many machines having been destroyed and the inventor's life threatened. Its merits were too valuable and too apparent to be entirely kept back, even by such furious and frenzied opposition, and when it did emerge it revolutionised the trade. Previously figures, which could not be produced by combinations of twilling and colouring, were formed by the aid of the

draw-boy, and such, or other appliances, or by the cumbrous and tedious modes known in tapestry work as *high and low warp*, but by neither mode were they so perfectly brought out as by this beautiful machine. . . . This machine is used in the manufacture of silk, cotton, woollen, and linen, and is alike suitable to all. Patterns of endless design and of wonderful beauty can be produced by it by the mere change of the cards passed over the surface of the perforated box, the particular pattern depending wholly on them. Improvements have from time to time been effected in this engine, and it has now been made so astonishingly perfect for the various fabrics for which it is adapted that it will be very difficult to supersede it by anything more suitable." By means of it designs are produced with the greatest distinctness of outline and delicacy of detail.

A growing demand for the Dunfermline product sprang up. William IV was the first of many royal customers, and Queen Victoria followed his example. For the famous " Crimean Hero Tablecloth," designed by Mr Balfour and representing the chief persons on the allied side associated with this war, the Queen gave an order, whilst another came from the Emperor Napoleon III. The ramifications of the Dunfermline trade extend over the world, America being the most extensive buyer. About the beginning of the nineteenth century there were over 1,000 hand looms at work. In 1836 the number had risen to about 3,500, giving employment to 5,000 persons. The advent of the power loom greatly increased the output and about thirty years later there were four power loom factories. In 1890 the number had risen to 10, employing about 6,000 persons, a large proportion of whom were women. " The business done in linen in Scotland," remarks Mr Steele in the *Scottish Bankers Magazine*, April 1912, " may be estimated at about £8,000,000 per annum and Dunfermline alone produces more than one-third of this amount."

Kirkcaldy was the first town in Scotland to introduce the power loom in 1821, and in the town and district over 8,000 persons are now employed in the industry. It is, however, more famous as the seat of the allied floorcloth and linoleum industry, which was started in Scotland by Mr Michael Nairn in 1847 and has attained such large dimensions that it has made the " lang toon " the

rival of Dunfermline in size and affluence. Mr Nairn's experiment in the making of floorcloth seemed so unpromising at first that it was spoken of by his neighbours as "Nairn's Folly." But the venture ere long turned out a complete success as the result of the widespread demand for this serviceable and relatively cheap form of floor covering. Several other firms took up the manufacture, and in 1877 the Messrs Nairn added a linoleum factory to their floorcloth works on the expiry of the patent held by Mr Walton, the inventor of the process and the founder of the Linoleum Manufacturing Company at Staines, Middlesex. Other Kirkcaldy firms followed their example, and towards the end of the century these were amalgamated under the name of Barry, Ostlere, & Shepherd. Another, the Fife Linoleum Company, also engaged in the industry. In addition to these three at Kirkcaldy, three others were started at Tayport, Newburgh, and in the neighbourhood of Dundee. The employees at the three Kirkcaldy works number between 8,500 and 4,000.

Besides Forfar and Fife, in most districts, with the exception of Aberdeen and Perthshire, in which the linen industry was formerly carried on to a greater or less extent, it has either become extinct or shrunk to small dimensions—in Edinburgh, for instance, not to speak of towns like Inverness, Kinross, Inverary. A similar fate has overtaken it in the west—in Lanarkshire, Renfrew, and Ayr—where the making of linen cloth was superseded by the cotton manufacture. While it steadily rose in these counties till well into the second half of the eighteenth century, it showed an equally steady decline in the last decades of it and the early part of the nineteenth, till in 1822 they were each credited with only between 25,000 and 20,000 yards. In 1875 only 11 of the 159 linen factories in Scotland were situated in the west. In 1890 the number had fallen to 6, though Paisley was eminent in the linen thread manufacture. In the latter year the total for Scotland was 186, in which about 85,000 persons were employed, the large majority of whom were women.

The process of linen manufacture begins with heckling, for which machines were invented, and by which the fibres of the flax are sub-divided into filaments of a fineness suited to the quality of the cloth to be made. It is then sent through the

dressing machine several times until it is formed into an even band an inch wide and a quarter of an inch thick. It is further drawn out in the roving machine, slightly twisted, and wound on large bobbins which are placed in the spinning machine and drawn out to the necessary degree of fineness and firmly twisted. The spinning is done by the wet or the dry process according to the purpose for which the yarn is destined. The full bobbins from the spinning frames pass into the hands of the reelers, who make the yarn into the required lengths. The yarn is generally bleached before being warped. After warping it is coated with paste, drawn through the heddles and the " reed," and placed in the weaving loom. From the looms the webs are passed through the rubbing machines, cropped, calendered, and pressed by machines adapted for the purpose.

Floorcloth is made from flax-tow and yarn in large looms, and the canvas is subjected to a complex process of sizing, painting, drying, and printing. Machinery for applying the paint and printing the pattern ultimately took the place of hand labour with very satisfactory results. In the making of linoleum the Walton process is applied in the " drying " of the linseed oil, *i.e.* the reduction of it to an elastic solid state. It next passes through the " cementing " process, by which the oil is mixed with proportions of kauri gum and resin and the preparation is cooked and, after being cooled, cut into slabs. The cork to be used with this cement is ground into powder varying in fineness according to the cloth to be made. The necessary proportions of cement, powder, and colouring are then mixed by machinery and the mixture passes between the calender rolls, where it is keyed on to a foundation of jute canvas. The reverse side of the cloth is then coated by the backing machine with a waterproof mixture, and the linoleum thus produced is seasoned in the drying room where it is hung for from two to four weeks according to the thickness of the fabric. The finished article is known as plain linoleum. In the case of printed linoleum the pattern is applied when the plain cloth is about half seasoned. Inlaid linoleum differs from printed (in which the pattern is merely printed on the surface, and therefore liable to suffer from wear) in having the pattern carried right through the fabric. The

most serviceable means of effecting this is the machine invented by Mr Walton for this purpose.

Dundee is the centre of the allied jute manufacture. It took its origin in one of those periods of depression to which the linen industry has been subject. The depression was specially acute in the decade between 1830 and 1840, and it was in these years that Dundee manufacturers had recourse in tentative fashion to the spinning and weaving of jute. In 1822 Mr Neish, a merchant of the town, who had received a small consignment of the fibre from London, had unsuccessfully endeavoured to get the local spinners to give it a trial. Ten years later he received a second consignment and on this occasion he succeeded in persuading a firm of manufacturers to try the experiment. The initial difficulty was the unsuitableness of the machinery then in use for its manufacture. Another consisted in the dry and hard nature of the fibre. The former was overcome by the introduction of improved machinery, the latter by the expedient of moistening the fibre with oil. This is done in the " batching room," where the raw material is sprinkled with oil and water. The fibres are dissevered by appropriate machinery and then pass through the processes of spinning and weaving similar to those applicable in the case of flax. Jute is one of the most easily dyed fabrics, but it does not naturally retain the colour well. A complex process is, therefore, needful in order to make the dye lasting, and the better class of jute goods is so treated that the colours are both bright and durable.

The products of the industry consist of sheetings, sackings, carpets, rugs, and many other fabrics. For the finer goods a combination of flax and jute, or cotton and jute, or cocoa fibre and jute is used. The comparative cheapness of the raw material enabled the manufacturers to sell them at a moderate price and this, in conjunction with excellence of workmanship, has made Dundee the centre of a world-wide trade, to which the Crimean War and the American War, by adversely affecting the supply of flax from Russia and raw cotton from the Southern States, gave a great impulse. In spite of recurring periods of depression and the growing competition of India, whence most of the raw material is imported, Dundee has maintained its supre-

macy and steadily increased its production. It has justly merited the title of "Juteopolis," for its linen manufacture, which in a number of factories is combined with it, is modest in comparison with the staple industry. It is also carried on to a considerable extent in some of the other Forfarshire towns and at Perth, Aberdeen, Tayport, and Springfield, near Cupar. In 1838 the number of tons imported was 1,136; in 1858 it had grown to 30,000; in 1868 to over 58,000; in 1890 to 206,759. In 1911 the number was 201,000. Dundee and district have had little to fear from the competition of the West of Scotland, though attempts were made at Glasgow and elsewhere to secure a share of the industry. These, however, proved ultimate failures or have remained on a very limited scale. In 1890 the number of factories in Scotland was 103, and of these Glasgow was credited with only 2. The number of persons employed was over 40,000. Twenty years later the number had increased to about 68,000, the large proportion, as in the case of the linen manufacture, being women.

In the early years of the nineteenth century the cotton industry had taken a firm hold in the west of Scotland, and the west remained its centre. A recent writer on the geography of Renfrewshire ascribes the fact to climatic conditions. "A moist atmosphere," says Mr Mort, "is necessary for the manufacture of high-grade cotton goods, otherwise the material becomes brittle and difficult to work. Now the average rainfall of many parts of the west coast is double that of the east coast. Thus the west coast possesses the valuable attributes (at least for the cotton worker) of a high rainfall and a humid atmosphere, and therefore the industry, by a process of the survival of the fittest, has come to be localised in the west." The humid climate of Manchester accounts, in part at least, for its pre-eminence in the cotton industry. Other factors contributed, such as the facility with which workers could be obtained. Improvements in the machinery, which Englishmen had invented in the second half of the eighteenth century, were made by Scottish manufacturers. In 1797 Mr Kelly of the New Lanark Mills produced a self-acting mule, and Mr Buchanan of the Catrine Mills also busied himself with the problem about the

same time and, in co-operation with his nephew, Mr Deanston, completed his invention in 1826. It was afterwards improved by Mr Robertson, a foreman in the Crofthead Mill in Renfrewshire, in conjunction with Mr Smith, who also improved the carding machine. With the self-acting spinning mule came the power loom which immensely increased the output of the cotton factories. The fabrics included plain calico, muslins, curtains, ginghams, pullicates; but the making of muslin became the speciality of the industry. The pioneer of this speciality was Mr James Monteith, who about 1780 warped the first muslin web attempted in Scotland, and successfully imitated the fabrics of Dacca and other Indian industrial centres.

In 1834 the number of cotton mills in Scotland had swelled to 134, compared with 19 in 1787. Aberdeen had some large factories, but the vast majority were located in Lanarkshire and Renfrewshire—74 in the former and 41 in the latter. In 1850 the number in these counties was 145. Ten years later the figures were about the same. In 1890 there was a drop to 114, the total for Scotland being 124, employing about 36,000 persons, of whom the large majority were women. Since then the decline has gone on increasing. This shrinkage has been due to the competition of Lancashire and Yorkshire with their enormous output, their more economical production, and their adoption of more up-to-date machinery. In this respect Scottish enterprise has lagged behind that of England, and the vast industrial development of the west in other directions has provided other avenues for capital and labour. That the Scottish manufacturers might have forestalled this regrettable decline is proved by the fact that the Glasgow Cotton Spinning Company has developed a large trade, and has shown itself capable of meeting its Lancashire rivals. In one branch, however—that of cotton thread spinning—Paisley has maintained the leading position, and practically controls the thread export trade. The development of this trade is largely due to Mr Patrick Clark, the founder of the firm of Clark & Co., and to Mr James Coats, the founder of that of J. & P. Coats. Both firms have established works in America and other countries. In 1890 the Messrs Coats became a public company, with control of the business of Messrs

Clark, with an authorised capital of $5\frac{3}{4}$ millions, which was subsequently increased to 10 millions, whose marketable value in 1913 was estimated at close on 56 millions. The mills at Paisley cover about 100 acres, and give employment to over 10,000 persons. "Half a million spindles are driven by engines of 30,000 h.p., which require the daily consumption of something like 400 tons of coal, and 15,000 tons of wood are used annually in the manufacture of about 250 millions of spools. The demand for spool wood at one time practically threatened the deforestation of various parts of Scotland, but the supply is now chiefly obtained from Northern Europe and North America. . . . The machines used in the making of the thread are of the latest type, and are wonderful in their accuracy. The doubling machine is so adjusted that it ceases to operate when one of the ends breaks or is missing, whilst the testing and measuring of the thread is carried out with the greatest exactness. The revolutions of the spindles require also to be finely judged, as a proper speed when the bobbin is empty becomes much too great when it is almost full, and it is therefore necessary to confine the speed of the spindles to a velocity which will not be excessive when the winding is almost complete. Thirty years ago the spindles made 3000 revolutions per minute, but they now make about 10,000, while the space occupied is less."

Not far off, at Kilbowie, on the north side of the Clyde, is the greatest sewing machine factory in the world, that of the Singer Manufacturing Company. The works, removed here from Bridgeton, Glasgow, in 1884, cover 46 acres, employ 6,000 persons, and turn out 13,000 machines per week, of which over 700 classes and varieties are catalogued. The sales in Great Britain and Ireland amount to about 200,000 a year. The sewing machine, it has been aptly said, has been the making of the thread industry. Renfrewshire has also maintained a considerable industry in the making of the lighter silk fabrics, such as gauzes, gossamers, chiffons, handkerchiefs, and ties, though the output is a stationary one. Mention should also be made of the Glasgow Weaving College, which dates from 1877, and provides a technical training in textile manufacture for workmen and designers.

In 1890 the total number of textile factories in Scotland was 747, and of persons employed in these industries 154,591, of whom more than two-thirds were women.

6. Secondary Industries

Modern chemistry has become an essential of many industries. It has not only revealed the marvellous substances and forces inherent in solids, liquids, and gases, but has shown how they can be practically utilised in connection with a large number of industries besides that specifically termed chemical. In this wider sense it should be regarded as a primary industry. But as a specific industry it is not so extensively carried on in Scotland as any of the foregoing and may, therefore, comparatively be treated as a secondary one.

In the narrower sense, it was introduced at Glasgow towards the end of the eighteenth century by Mr Charles Macintosh, who began the manufacture of sugar of lead and chloride of lime, and also of waterproof cloths. In the first year of the nineteenth Messrs Tennant, Knox & Co. originated the factory at St Rollox for the manufacture of sulphuric acid, chloride of lime, soda, soap, etc., which prospered into one of the most extensive chemical works in the world, whose monster chimney, 435½ feet high, is one of the prominent landmarks of the city. These works now form part of the great combination known as the United Alkali Company of Britain, and the more recent works of the Eglinton Chemical Company and the Irvine Chemical Company are also included in this combination. Its chief products are sulphuric acid, hydrochloric acid, salt cake, bleaching powder. Formerly the alkali works produced large quantities of soda ash (carbonate of soda) and caustic soda by the Leblanc process. In 1876, for instance, about 50,000 tons of common salt were converted in Scotland into these substances. This process was gradually displaced by the Ammonia Soda process, which, however, is now confined to England, and the Scottish works at Glasgow, Irvine, Kirkintilloch, and other places are devoted to

the manufacture of acids of various kinds, as well as sulphites, Epsom and other salts, sulphates, borax, phosphates, etc.

Ammonia is obtained mainly as a bye-product of other industries, such as gasworks, paraffin oil works, works for the recovery of blast furnace gases, and in recent years the manufacture of sulphate of ammonia has been extensively developed from these sources. "Among the first to take up the subject of the recovery of tar and ammonia from blast furnaces," says Mr Jones in a paper dealing with the origin of the industry in the Journal of the Iron and Steel Institute for 1885, "was Mr William Ferrie, of the Monkland Ironworks. . . . This important problem was (also) taken up in 1879 by Mr John Alexander and Mr A. K. M'Cosh, of the firm of William Baird & Co., and the condensation ideas or principles have been handled by them in a most masterly fashion. The first large scrubber was erected by them at Gartsherrie in 1881, and the second in 1883. Almost simultaneously the subject was attacked by other ironmasters, notably by the Messrs Neilson of the Summerlee Ironworks, and the Messrs Addie of Langloan. . . . Mention should also be made of the names of Mr Henry Aitken, Mr J. Chapman, and Mr Gorman. . . . At the Gartsherrie Ironworks, Coatbridge, and the Lugar Ironworks and Muirkirk Ironworks, Ayrshire, the Messrs Baird have erected gigantic plant for carrying out the above principle (the Alexander and M'Cosh process). They have in fact been the pioneers of this industry, and the extraordinary amount of courage and ability which they have shown in finally bringing things to a complete practical success is worthy of the highest admiration."

Fifteen years later the industry had made substantial progress. "In 1885," says Mr Henry Bumby writing in the same journal for 1901, "the recovery of tar and ammonia from the blast furnace was an infant industry just emerging from the region of small scale experiment. At the present time, with one exception, every works in Scotland either has a complete by-product plant or is erecting one, and all the earlier plants have been considerably enlarged and improved. . . . In designing these improvements no one has done more than Mr A. Gillespie, of Glasgow, and the three by-product works recently erected to

his designs are admittedly the 'show' plants of the country. . . . The amount of sulphate of ammonia recovered at the different works varies from 20 to 25 lbs per ton of coal used in the furnaces, and the pitch and oil from 150 to 200 lbs.—the variations depending largely on the nature of the coal used."

The progress of the industry may be measured from the fact that during the decade 1889-99 the number of tons annually produced rose from about 40,000 tons in the former year to nearly 73,000 in the latter. In the same period the number of works in which sulphate of ammonia was made increased from 51 to 63. Its value as a manure accounts in part for the growing demand represented by these figures.

The manufacture of dichromates of potassium and sodium, so largely used in the preparation of pigments, such as chrome yellow, has also been carried on in Glasgow for nearly a century. The cyanide process of gold extraction adopted in 1888-89 gave a great impulse to the production of potassium cyanide, which was previously used mainly in photography and electro-plating. The Cassel Gold Extracting Company, the owners of the patents for the new process, built a factory in Glasgow to meet the increasing demand for this salt, and large quantities were made and exported to the Transvaal and other gold producing countries. The Company acquired the exclusive right to use the process devised in 1890 by Mr Beilby, who became one of its directors and its scientific expert, and built an additional factory at Glasgow. The manufacture of ferro-cyanide, which is recovered from crude coal gas, displaced that of alum in the works of the Hurlet and Campsie Alum Company at Lennoxtown, Falkirk, and Hurlet, the supply of alum shale, which had long been the staple manufacture at Campsie, having become exhausted about 1880.

The distillation of wood yields acetic acid, methyl alcohol, acetone, wood tar, and other chemical products, and these products are manufactured at Camlachie Chemical Works, the Cartvale Chemical Works, Paisley, and elsewhere. Coal tar and blast furnace tar are distilled into naphtha, light oil, creosote oil, heavy oil, and by the end of the nineteenth century the number of tar distilling works in Scotland had increased to 46. From naphtha

and light oil, benzine, which is largely used in the manufacture of aniline, and from creosote, carbolic acid, antiseptics, and sheep dips are produced.

The discovery of nitro-glycerine by Sobrero in 1846 was utilised some years later by Alfred Nobel as a liquid explosive in mining. Its defects and dangers as an explosive led to the prohibition of its manufacture in Great Britain, but after further experiments Nobel succeeded in overcoming these drawbacks by the invention of dynamite, the manufacture of which was taken up by Nobel's Explosives Company at Ardeer in Ayrshire. During the last quarter of the nineteenth century the Company grew into a vast concern. In 1876 its operations were confined to the production of dynamite, nitric acid, and detonators; since then it has added the manufacture of blasting gelatine and its modifications, gelatine dynamite and gelignite, ballistite or smokeless powder and its modification, cordite, picric acid for lyddite, guncotton for cordite, compressed guncotton for torpedo charges, shells, military and naval guns, armour piercing projectiles, etc. Besides Ardeer it possesses three other factories in Scotland—two near Polmont and one at Linlithgow, and the growth of its operations may be gauged from the fact that its scientific staff increased from 5 in 1876 to 53 in 1900, and the number of its workmen from 102 to over 4000.

Compressed and liquified gases are manufactured by the Scottish and Irish Oxygen Company established at Polmadie in 1888. Compressed oxygen is used for the lime light, for brazing and lead burning, for respiration in case of asphyxia, and in diseases of the lungs and heart. Another product, compressed carbon dioxide, is applied in refrigeration and in the preparation of aerated waters. The production of iodine from kelp, imported from the Hebrides, Ireland, and Norway, showed a marked decrease during the second half of the nineteenth century. In 1846 there were 20 factories in the West of Scotland; in 1900 the number had fallen to 4, which were situated at Falkirk, Clydebank, Kilwinning, and Bonnybridge. The fall in the value of potash salts, in consequence of the working of the deposits at Stanfurt in Germany, and the growing importation of Peruvian iodine were chiefly responsible for this decline.

In Edinburgh several firms devote themselves to the manufacture of fine chemicals. Naturally in the city, which has long been the seat of one of the greatest medical schools of the world, medical chemicals occupy a foremost place. Among these chloroform, which Sir James Simpson was the first practically to apply, is largely produced. Other important products are morphine, caffeine, cocaine, theobromine, strychnine, salicin, capsicin, podophyllin. Surgical dressings, chemical manures (super-phosphates), and fertilisers (fish manures) are also manufactured in considerable quantities. The manufacture of vulcanite and other rubber goods is extensively carried on, whilst gelatine and glue are manufactured at Gorgie and Cramond. Medical chemicals in great variety and fertilisers (including basic slag) are also produced at Glasgow, whilst Paisley takes the lead in the production of starches.

In the last quarter of the nineteenth century a marked development took place in the manufacture of paints and colours and the preparation of varnishes. Coal tar dyes came to be largely used in the making of colours; liquid paints, enamels, prepared distemper colours and stains were introduced, and the quality of paints improved with the improvement of grinding machinery. Colours which were formerly rare became more widely available in consequence of the new processes which lowered their price. A similar development is observable during the same period in the soap and glycerine manufacture. Whilst formerly tallow was almost the only fat used in soap making, the use of vegetable and nut oils resulted in the production of a superior quality of soap (quick lathering or self-washing soaps). Another important advance has been the recovery, by means of a simple process, of glycerine as a bye-product of soap works, which is now manufactured in the two forms of crude glycerine, and chemically pure glycerine—the last being mainly used for medical and pharmaceutical purposes.

The dyeing industry received a great impulse from the production from coal tar by Mr W. N. Perkin of a violet colouring matter to which the name of mauve was given. Mr Perkin carried out his experiments in the dyeworks of Messrs Pullar at Perth. A great demand sprang up for this dye until it was

superseded by a new violet of a brighter colour. Many other aniline colours followed, all produced from coal tar, and the Perth works of Messrs Pullar and Messrs Campbell were successively enlarged to cope with the demand of this rapidly increasing industry. Perth, with its railway facilities and its abundant water supply from the Tay, was admirably fitted to become the arena of the enterprise of the Pullars and the Campbells, which furnished employment to several thousands of workers. The Perth dyeworks are mainly devoted to job-dyeing which embraces every kind of garment, household requisites from lamp shades to carpets, boots, gloves, etc. Dyeing is a process which requires considerable chemical knowledge and great care in the use of the various acids and alkalis on the part of the worker. Fibres belonging to the vegetable kingdom (cotton, flax, hemp, jute, etc.) have to be treated differently from fibres belonging to the animal kingdom (wool, silks, etc.) On the former acids act injuriously, while alkalis have the same effect on the latter.

" A dye house," says a writer in the *Bankers Magazine*, in describing the process as carried out in these works, " is divided into sections, each controlled by a foreman, and in each of these sections a separate colour is, generally speaking, dyed. It is quite remarkable how perfectly the dyer strikes the exact shade for each of the innumerable patterns put into his hands. . . . It is first of all immersed with other goods for the same colour, and which have been similarly prepared, in a great vat, in which the necessary dyestuff has been dissolved, and the goods are kept constantly on the move for at least an hour and a half. They are then taken out, washed up, if necessary, and the water extracted from them in a hydro-extractor, from where they are conveyed to the stoves for drying thoroughly. From thence they pass through the hands of the examiners, who, if they find all correct, pass them to the finishers, who iron, press, or calendar the goods, according to what they are, and they are then sent to the warehouse for dispatch to the customer."

The technical training in bleaching and dyeing in Scotland was greatly benefitted by the grant of £10,000 made in 1907 by the Trustees of Mr T. Graham Young, to assist in making provision

for the teaching of this subject in connection with the Chair of Technical Chemistry in the Glasgow and West of Scotland Technical College.

The manufacture of dyes received a great impulse from the interruption of the import from Germany caused by the war. Before 1914 the Germans had acquired a well-deserved supremacy in the production of aniline dyes, and even the strong prejudice against everything German which the war evoked could not contest this supremacy. The German has been quick to apply scientific results and methods to industry, and this is specially apparent in the chemical industry in general and the dye industry in particular. The British Chemical Mission to Germany after the war has frankly recognised the fact, and nothing but harm can result from the fanatic tendency inspired in prejudiced minds by national passion, masquerading in the guise of patriotism, to ignore or belittle it. " Whilst," to quote the summary of the report of the Mission, " preeminent as manufacturers of the so-called heavy chemicals—sulphuric acid, soda, soap, etc.—we hold but a minor position as regards the manufacture of fine chemicals, intermediates and dye stuffs; in particular we have failed to hold and extend the dyestuff industry, although this industry was originated here." At the same time the war quickened the scientific resource as well as the energy of the nation, and one result of the war pressure was a marked advance in the home manufacture of dyestuffs. " Before the war," said the Chairman of the Bradford Dyers' Association at the annual meeting of the Association on the 27th February, 1920, " not 10 per cent. of the aniline dyes used in the United Kingdom were made in this country, and the total weight manufactured would not exceed 2,000 tons a year. We have it on the authority of the Board of Trade Journal of the 5th instant, that the production is now 25,000 tons a year, which is more than 20 per cent. in excess of the total weight of aniline dyes consumed in this country in the years immediately before the war, and I think it may be safely said that the progress made by the colour-making industry since 1914 has been greater than those having real knowledge of the difficulties and the problems involved would have thought possible . . . It is true

we have not the variety, and that we lack some of the best colours, but, on the other hand, it is beyond question or doubt that in the supply of dyes we in this country are in a much better position than any other country in the world, not excluding Germany." It should be noted, however, that this optimistic conclusion is not altogether shared by the Chemical and Dyestuff Traders' Association, which in a recent memorandum to the Board of Trade (October, 1920) pointed out that the policy of making the United Kingdom independent of external supplies of chemicals and dyestuffs had not been successful in securing either the range, quality, or quantity of the materials supplied by State-aided home enterprise.

Sugar refining made great progress during the first three-quarters of the nineteenth century. Greenock became the centre of the industry, which was also started in Glasgow, Port-Glasgow, Leith, and Dundee. In 1812 there were 5 refineries at Greenock; in 1860 the number had increased to 16. There were three at Glasgow, two at Leith, and one at Port-Glasgow. The growth of the industry, from about the middle of the century, is apparent from the rapid rise of the tonnage of raw sugar refined in the Clyde works. In 1857 the number of tons imported was 38,336; in 1862 it passed the 100,000, and in 1867 it stood at 178,013. During the last quarter of the century it showed a marked tendency to decrease. In 1875 the number of refineries in operation at Greenock had fallen to 13, whilst those at Glasgow and Port-Glasgow ceased operations. In 1900 the number had fallen to 5. The decrease was not due to lack of enterprise on the part of the manufacturers, but in the main to the bounties granted to foreign refiners who were thereby enabled to sell at a cheaper rate in the British market. The consequence was that whilst the consumption of refined sugar in Great Britain increased from 860,000 tons in 1875, of which all but 100,000 was produced in this country, to 1,489,000 in 1900, nearly one million of this latter quantity was imported from abroad, chiefly from the Continent, and the quantity refined in Britain had dropped by 150,000 tons. The refining process, generally described, consists in the dissolution of the raw sugar in water, the filtration of the liquid first through cotton cloth and then through charcoal, and

its concentration into sugar crystals. Various appliances have been invented in the course of the century whereby the various stages of the process have been improved.

Great progress has been made in the production of sweets and the preserving of fruits, meat, and vegetables. Confectionery is largely made in Edinburgh, Glasgow, and Dundee. Dundee long took the lead in the manufacture of jams, of which Mr James Keiller was the pioneer in the first half of the nineteenth century. The proximity to the orchards of the Carse of Gowrie explains this early predominance in jam making, to which Mr Keiller ere long added the making of marmalade. The demand for this preserve spread from Dundee to other parts of Scotland and ere long to England and ultimately to foreign lands. The success of the enterprise led to the extension of the industry, not only in Dundee and the adjacent region (Coupar-Angus, Newtyle, and Blairgowrie), but to other centres in Scotland. Fruit preserving led too to a great development of fruit growing in districts suitable for fruit culture, notably in Clydesdale, the Strathearn and Blairgowrie districts of Perthshire, and parts of Stirlingshire. Crieff, Carluke, Glasgow, Edinburgh, as well as Dundee, acquired prominence in the preserving industry, which includes the production of jams and jellies made from a variety of imported as well as home grown fruits.

The centre of the meat preserving industry in Scotland is Aberdeen, where it was introduced by Mr John Moir in 1822 and whence it was extended to Peterhead, Glasgow, and Leith. Nine establishments for preserving provisions were in operation in Scotland about fifty years later, five of which belonged to Aberdeen. In addition to these five there were three engaged in salting meat, and the total output of preserved meat, fish, game, vegetables, etc., from these Aberdeen factories was valued at £221,000 per annum.

Papermaking, already of considerable extent towards the end of the eighteenth century, made rapid progress in the first half of the nineteenth. This progress was accelerated by the repeal of the duty on paper in 1861. The twelve mills in the Edinburgh district in 1773 had increased to twenty-two in 1868 and the total for Scotland in the latter year was fifty-seven. The

villages on the Esk and the Water of Leith are still the centre of the industry, which is also carried on at Airdrie, Caldercruix, Paisley, Milngavie, on Tayside at Guard Bridge and Dundee, at Aberdeen, and elsewhere. Rags were long the raw material of the manufacture, and it was not till past the middle of the nineteenth century that esparto grass and wood pulp were utilised. Machinery for reducing the raw material to pulp was invented in Holland about the middle of the eighteenth century and ere long superseded the more primitive method of pounding the fermented rags in large mortars. Many years elapsed, however, before Mr Robert produced a machine for converting the pulp into paper in place of the old tedious manual process. This machine was improved by the Messrs Bertram of Edinburgh, and the machine exhibited by Mr George Bertram in the exhibition of 1862 was adjudged to be incomparably the best hitherto constructed. Further improvements in the machinery for preparing the pulp and producing the finished article have been made, and at Edinburgh several engineering firms are now employed in the production of this machinery.

Edinburgh and district have also long had extensive milling, baking, and brewing industries. There are large flour mills at Haymarket, Stockbridge, and Leith, and the biscuit factories are also a special feature of the city's industrial products. The fact that Midlothian has long been a rich agricultural county and takes first place among the Scottish counties in the production of wheat and barley, though only fifth in that of oats, explains the rise of the milling industry. Its development has, however, depended on the large importation of grain into Leith, which alone suffices to meet the demand of the millers. The extensive brewing industry is due to the supply of water of a specially appropriate quality derived from the strata of the Upper Old Red Sandstone on the southern side of the city and at Duddingston, where quite a cluster of breweries has sprung up in recent years. Brewing is also extensively carried on in the Wellpark Brewery at Glasgow, whose establishment dates from the middle of the eighteenth century, and a speciality of the production in the west is Tennent's Lager and Munich Beers. Breweries are numerous throughout the country, but the ten-

dency during the last twenty years has been to diminish the number of the smaller ones. The small brewery can no longer compete with the large one. In Scotland the number in 1899 was 129; in 1912 it had fallen to 79. In the same period the production fell from 240 million barrels per annum to about 200 millions. The export from Scotland was 136,000 barrels in 1912, or 7 per cent. of the total production.

There has been a marked advance in the distilling of whisky since the middle of the eighteenth century, when about 50,000 bolls of barley produced 504,000 gallons, which at a duty of 7d. per gallon yielded £14,700 revenue. In 1911 the production in the United Kingdom had reached 27,093,197 gallons, which at 14s. 9d. per gallon yielded close on 20 millions of revenue. In 1786 the first distillery was established at Glasgow—the fourth licensed in Scotland. The increased taxation on malt gave rise to smuggling and the illicit still was in operation all over the Highlands. In 1823 there were no less than 1400 prosecutions for such contraventions of the law. Sixty years later the number had fallen to 22 in consequence not only of the enforcement of the law, but of the lowering of the spirit duties. The whisky distilled is of two kinds—malt and grain—according to the method of distilling, and a blend of both is sold. The increase of 3s. 9d. in the duty per gallon in 1909 affected the production and consumption to a considerable extent and lessened the number of distilleries at work, which fell from 159 in 1900 to 124 in 1910. Eighty-eight of these were situated in the counties of Banff and Elgin, Argyle and Inverness. In 1912 the export from the United Kingdom was about 10 million gallons.

The glassmaking industry is carried on at Edinburgh and Glasgow. Whilst in the earlier part of the nineteenth century only bottle glass and flint glass, or crystal, were made in Scotland, the manufacture of plate or fine mirror glass and other varieties was gradually introduced. Though the name flint glass is still in use for crystal, flint has long been superseded by a fine white sand obtained from the forest of Fontainebleau. The industry was much hampered by the heavy excise duties levied on glass, which up to 1845 were 56s. per cwt. for flint glass and 7s. for bottle. With the repeal of these duties in this year it

materially increased and the value of glass exported from Scotland, which was £62,140 in 1861, had risen to £106,555 in 1867. Table ware formed the bulk of the articles produced and there was comparatively little competition for the British trade from abroad. But cheaper labour and superior facilities in the production of table ware in France, Germany, and Sweden seriously affected the British manufacture during the last quarter of the nineteenth century. The Continental workmen, moreover, more readily adopted labour saving appliances than their British fellows, and where these have been introduced the latter have not shown a disposition to take full advantage of them. The Holyrood glass works, which were started by Mr Ford about the beginning of the century, maintained a high reputation throughout it. They have, however, recently ceased to exist, but the industry is still carried on by the Messrs Jenkinson at the Norton Park Glass Works, whilst Messrs Millar & Co. developed a far-famed speciality in glass engraving and ornamentation. More recently glass engraving has been largely superseded by etching by means of hydro-fluoric acid, and many improvements in the machines used in the process have been introduced. Mr Ballantine was a pioneer in another branch of the industry—that of glass painting—and was selected by the Fine Arts Commission to execute the windows for the House of Lords. The firm has produced many of the finest specimens of stained glass in Scottish churches and other public buildings. Glasgow has also excelled in the various branches of the industry, especially in the production of all kinds of globes and shades for gas lights, duplex lamps, and electric light. The bevelling and silvering of plate glass are also extensively carried on in the city.

The first pottery in Scotland was established at Glasgow about the middle of the eighteenth century. Later in the century Mr Jamieson discovered a rich bed of clay at Portobello and started a brickwork and pottery, around which grew the village—the nucleus of the widely-known modern watering place. In the beginning of the nineteenth the Verreville Pottery was founded at Glasgow and before the middle of it two more—the Glasgow and the Britannic Potteries—had come into existence. By the year 1868 the number in Scotland was 14, employing fully 5,000 per-

sons. The materials used in the manufacture of earthenware are imported from the south of England and consist of clays from Dorset and Devonshire, china clay and Cornish stone from Cornwall, and flints from the chalk cliffs, which after being rolled about in the Channel are thrown up on the French coast near Dieppe and exported to this country in large quantities. These ingredients are mixed in varying proportions according to the ware to be made and reduced by grinding to a thick cream. The mixture then passes through sieves, which retain the sand or grit, and this is thereafter pumped into presses lined with cloth, which retain the clay whilst allowing the water to exude. It is then put through the pug mill—an iron cylinder about 5 feet long, in the centre of which is a shaft with knives attached in spiral fashion—from which the clay emerges thoroughly solidified and of the same consistency. The introduction of the pug mill has greatly lightened the potter's labour in the preparation of the clay, and machinery has in many of the largest potteries done away with the potter's wheel itself, though there are still many articles which can only be made by hand. After being shaped in moulds, according to the article to be made, the clay undergoes the firing or burning process in the " biscuit " kiln. The decoration of the ware is ordinarily done in the " biscuit " state. The designs are first engraved on copper plates, from which they are printed on tissue paper which is applied to the ware and the colour rubbed firmly into the pores. It then undergoes the glazing process, which is completed in the glost kiln. Besides ordinary and ornamental ware a large quantity of sanitary ware is manufactured in the Glasgow potteries, whose output finds an extensive market in America and the Colonies. Stoneware, fire bricks, and building bricks are also extensively manufactured at Garnkirk, Glenboig, Portobello, and other places.

7. Rise and Extension of Railways

The beginning of railway construction in Scotland goes back to the eighteenth century. The first railways were waggon tracks laid down for the purpose of facilitating local goods traffic con-

sisting chiefly of coal and iron. In 1745, the year of the Battle of Prestonpans, a trainway was in operation in the neighbourhood of the battlefield. It consisted of cast iron rails placed on transverse planks and served to convey the coal waggons, drawn by horses from the mines at Tranent, to the harbour of Cockenzie on the Firth of Forth. Such a track was in use from the collieries at Little Govan to the Clyde at Springfield as early as 1778, horse haulage being used as in the case of canal traffic. Another line connecting Kilmarnock and Troon Harbour, a distance of fully ten miles—the nucleus of the later Glasgow and South-Western—was opened in 1811. The iron rails were 4 feet apart and 4 inches broad, rested on stone blocks, and crossed the Irvine by a bridge of four arches, each of 40 feet span. Over this track a horse could haul two loaded waggons at the rate of two miles an hour. Passenger carriages were also run on it at a more expeditious rate of speed and in this respect it was an anticipation of the later tramway system of cities. A few years later George Stephenson successfully solved the problem of applying steam to railway haulage and in 1825 the Stockton and Darlington Railway was opened for the conveyance of passengers as well as goods. In the following year the first Scottish railway, on which the proprietors were authorised by Act of Parliament to run " locomotives or moveable engines "—that between Monkland and Kirkintilloch on the Forth and Clyde Canal—was completed and opened for traffic. Its length was ten miles and at first horse haulage was used, one horse drawing four waggons of coal or ironstone, equal to 12 tons, from Monkland to the Canal at Kirkintilloch and returning with the empty waggons at the rate of three journeys in two days. By 1832, however, two locomotives were at work on the line with the result that the cost of carriage was greatly reduced and the rent of the collieries proportionately enhanced to the proprietors. Within ten years the line was doubled and an extension, authorised by Parliament in 1826, was carried out by another company in the Monkland coalfield known as the Ballochney Railway. In 1835 powers were obtained by a third company for a further extension, under the name of the Slamannan Railway, from the termination of the Ballochney line, through Slamannan and Avonbridge, to the

Edinburgh and Glasgow Canal at Causewayend. In 1848 the three companies were amalgamated as the Monkland Railways and in 1865 were acquired by the Edinburgh and Glasgow Railway, which, later in the same year, became part of the North British system. The old Monkland-Kirkintilloch Railway may thus be regarded as the nucleus of the North British. In the same year that the Ballochney Railway was sanctioned, Parliament authorised an extension westwards from the Monkland coalfield to Glasgow under the name of the Garnkirk Railway—the nucleus of the Caledonian. The rapid industrial development of Glasgow necessitated a cheaper and more expeditious supply of coals than could be obtained by water carriage on the Monkland Canal. The line, 8¼ miles long, cost £12,000 per mile and followed the course of the Canal. It was opened in 1831, the first train being drawn by a locomotive named the "George Stephenson" and driven by Stephenson himself. "The city terminus was St Rollox," says Mr Eyre Todd. "Two locomotives, weighing 6½ tons each, were got from Stephenson's works at Newcastle, and on an autumn day the railway was opened with much ceremony and *éclat*. An engraving of the time shows the two trains passing each other on the double line of rails at the bottom of a shallow cutting. The squat, little, low engines have tall chimney-stalks, and the driver stands on a small open platform, while the train consists of four open trucks filled with passengers, two covered carriages on the model of the old mail-coaches, with the guards sitting on the roof, and a high open char-a-banc in the rear occupied by ladies. . . . The train weighed over 100 tons; nevertheless, it is recorded, the engine 'advanced under this prodigious load, not only with perfect freedom, but at the speed of a stage coach.'" It proved a boon to the Glasgow factories, the cost of the carriage of coal from the Monkland collieries to Glasgow ere long falling rfom 8s. 6d. to 1s. 8d. per ton. Passengers as well as goods were carried, and on the Glasgow Fast Day in October, 1834, when as many as six trains were despatched from St Rollox, about 1,250 passengers were forwarded. Three years later the system of collecting the fares in transit gave place to that of purchasing tickets before starting on the journey. The increase in the passenger traffic

was even more substantial than in that of minerals. Whereas in the first five years after the opening of the line the tonnage of minerals carried rose from 114,000 to 140,000 tons, the number of passengers increased from 62,000 to 145,000.

Another line running between Wishaw and Coltness, which may also be regarded as a nucleus of the Caledonian, was opened in 1833. In 1837 powers were obtained by a company to construct a line from Glasgow to Paisley, Kilmarnock, and Ayr—another important step towards what became the Glasgow and South-Western Railway.

On the eastern side of the country railway extension may be said to have started with the line which connected the capital with Dalkeith, by way of Fisherrow, with a branch to Leith, and which was authorised in 1826. This line, popularly known as "the Innocent Railway," was 17½ miles in length and was opened in 1831, horse traction being used for the conveyance of goods and passengers. Although the company was authorised to use self-moving locomotives, these horse-drawn carriages were run as late as 1845, a stationary engine being used to haul them by means of ropes up the tunnelled incline from Duddingston to St Leonard's station. During the next 30 years or so powers were successively obtained by various companies and lines constructed to connect Edinburgh with Glasgow, Berwick, Hawick, Carlisle, Dunfermline, Alloa, Stirling, Perth, Dundee. The company which constructed the line from Edinburgh to Berwick, with a branch to Haddington, opened in 1846, took the name of the North British, and this company gradually absorbed the others operating in the south-eastern and eastern region from Berwick and Carlisle to the Tay, and gradually added to its mileage by the construction of branch lines within the area in which it is practically supreme. It extended its radius northwards of the Tay to Arbroath, Montrose, and Bervie, with running powers from Montrose to Aberdeen. Westwards it carried its connections by amalgamation or new construction to Bathgate, Airdrie, Coatbridge, Hamilton, Bo'ness, Grangemouth, Larbert, Aberfoyle, Helensburgh, and Balloch on Loch Lomond. In 1889 it took powers to penetrate the West Highlands by a line running from Helensburgh to Fort William, a distance of 100

miles, which was opened in 1897 and subsequently extended westwards to Mallaig and northwards to Fort Augustus. In order to obviate the drawback of crossing the Forth and Tay by ferry boat, it carried out two of the greatest feats in railway construction by the bridging of these two firths. The first bridge across the Tay, two miles in length, which was opened in June 1878, was too slender and too badly constructed to bear the weight of traffic and the wind pressure, and was destroyed by a furious gale on Sunday night, the 28th December, 1879, the passenger train from Edinburgh to Dundee, which attempted to cross it on the evening of that day being precipitated with its living freight into the water below. It was replaced by a far more substantial structure, which was opened in 1887. The consequent increase by the East Coast traffic between north and south made it necessary to bridge the Forth between North and South Queensferry, and with the co-operation of the English North-Eastern, Great Northern, and Midland Companies the Parliamentary sanction of this great undertaking was obtained in 1882. The bridge was designed by Sir John Fowler and Sir Benjamin Baker on the cantilever principle and its construction, which was carried out by the former, was completed in 1890. Its opening, in turn, necessitated the enlargement of the Waverley Station at Edinburgh, begun in 1895 and completed in 1900. At the date of its opening it was, and probably still is, the largest station in Great Britain, comprising over 23 acres, of which fully the half are under roof. The two main line platforms are each about 560 yards in length, with four dock platforms at each end of an average length of 180 yards. The total cost of the station and the reconstruction of the Waverley Bridge was 1½ million pounds. The goods station at Portobello, one of the largest in the United Kingdom, has also in recent years been greatly extended. Another great engineering work was the construction of the " City and District " line, underneath the heart of Glasgow, to connect with the eastern line to Edinburgh via Bathgate and the Helensburgh line along the north side of the Clyde.

Since the incorporation of the Company in 1844 for the construction of the line between Edinburgh and Berwick, with a branch to Haddington, its mileage has steadily increased until

it is now the longest of all the Scottish railways. The Edinburgh and Berwick line was about 62 miles long. In 1864 the mileage had swelled to 749. About fifty years later (1912) it had nearly doubled with 1,339 miles. A corresponding increase had taken place in the traffic. In 1864 the number of passengers and the tonnage of goods and minerals carried were over 7 millions and $6\frac{1}{4}$ millions respectively, and the receipts were £1,261,785. In 1912 the figures were 34,984,829 passengers and 29,867,262 tons of goods and minerals, and the income was over 5 million odds, whilst the paid up capital reached a total of 71 million odds.

The Caledonian Railway Company, like the North British, has grown into the great dimensions of to-day by means of amalgamation as well as direct construction. Though the Company bearing this name was incorporated in 1845, its genesis, as already noted, may be found in the Glasgow and Garnkirk and the Wishaw and Coltness Railways, which it amalgamated in 1846 and 1849. It was formed to construct a line from Carlisle up the valley of the Annan, over the Beattock summit, into Clydesdale to Edinburgh in the east, Glasgow in the west, and Greenhill in the north. The great obstacle to the realisation of the scheme was the sharp gradient to the Beattock summit, which appeared at first to be insuperable. An alternative line with an easier gradient from Lockerbie up the Nith to Kilmarnock and Glasgow was proposed and debated. But ultimately the Annandale route was selected, and the line as originally conceived was completed in 1848, the total length being 144 miles. From Greenhill northward the Scottish Central Railway, completed in 1848, ran to Perth. Another line, constructed by a separate Company and opened in 1847, connected Perth with Dundee. From Perth northward the Scottish Midland, completed in the same year, extended to Forfar, whence the North-Eastern Railway extended to Aberdeen. By a series of amalgamations carried out in 1865-66 these companies were absorbed into the Caledonian, which then became the owner of the whole line from Carlisle to Aberdeen. From this line a series of branches, as the result of further amalgamations or new construction, diverge east and west. The connections to the west extend to Dumfries,

Portpatrick, Glasgow, Greenock, Kilmarnock, Ayr, Wemyss Bay, Oban, Ballachulish, Crieff, Blairgowrie, Kirriemuir, Brechin; to the east, Peebles, Dolphinton, Edinburgh, Alloa, Dundee, Arbroath, Montrose. Several of these connections, particularly the Castle Douglas-Portpatrick, and the Callander and Oban lines—the latter completed in 1880—are not owned, but only worked by the Caledonian, and from Larbert to Edinburgh it has only running powers over the North British. From Glasgow to the capital it maintains a through service by a line which was completed in 1866.

The Caledonian has not been called on to face such engineering problems as the bridging of the Forth and Tay Firths. But it has to its credit the construction of the longest tunnel in Scotland connecting Greenock and Gourock, which occupied five years. Another work of vast difficulty was the construction of the Glasgow Central Underground Railway, 7 miles in length, in order to obtain direct access to the docks instead of running their trains over the North British round the north of Glasgow. Up to 1873 the Glasgow terminus was on the south side of the Clyde, but in this year an Act was obtained to bridge the river and construct the Central Station in Gordon Street. Both were subsequently extended, and this extension, begun in 1901, was completed in 1910. During the last fifty years its mileage has steadily grown from 230 miles in 1864 to 900 in 1912, with a corresponding increase in the number of passengers and the tonnage of goods and minerals carried from about 8 and 7½ millions to 31,684,886 and 26,393,166 respectively. Though the latter numbers are less than in the case of the North British, the total receipts were somewhat larger for the Caledonian than for its rival. In 1912 they amounted to £5,140,822 compared with £1,660,983 in 1864, whilst its paid up capital rose from 18 million odds to nearly 74 millions.

In mileage the Glasgow and South-Western is somewhat smaller than the Highland Railway. But it takes rank after the North British and Caledonian in the extent and value of its traffic, whilst earlier in date than either. In 1811 the Kilmarnock and Troon Railway was only about ten miles long. In 1837 an Act was obtained to connect Glasgow, Paisley, Kilmar-

nock, and Ayr, the 40 miles being completed in 1840, though, owing to engineering difficulties, the line passed only within 5 miles of Kilmarnock. In 1846 another company, with the co-operation of the Ayrshire Company, obtained permission to construct a railway to connect these towns by way of Cumnock and Nithsdale with the Border, and on the completion of the connections in 1850 the two companies were amalgamated as the Glasgow and South-Western. In 1865 it absorbed the line from Dumfries to Castle Douglas and Kirkcudbright. From the main line through Renfrew and Ayr shires a number of branches diverge to Greenock, Ardrossan, Largs, and other places. From Ayr an extension southwards was made by a separate company to Dalmellington in 1856 and amalgamated two years later. Another extension by way of Maybole to Girvan was completed in 1860 and absorbed in 1865, though the portion between Ayr and Maybole is only leased to and worked by the company. A further extension from Girvan to Portpatrick, opened in 1876, was acquired in 1892. Besides the two main lines from Glasgow to Dumfries and Carlisle, and to Ayr and Portpatrick respectively, with their various branches, the company is joint owner with the Caledonian of the Glasgow, Barrhead, and Kilmarnock Railway and a direct route between Edinburgh and Ayr, via Lanark and Carstairs, over part of its system, was created by the extension of the Caledonian Lanark-Douglas branch to Muirkirk. Whilst the south-western region which it serves is largely agricultural, it derives a large mineral and goods traffic from the industrial and mining districts of Renfrew and Ayr shires. It has a considerable share of the Clyde coast traffic by way of Greenock, and of the express passenger traffic from Glasgow to England, via Dumfries and Carlisle, and to Ireland, via Ardrossan or Stranraer. In order to facilitate the through traffic with the North British, the Glasgow Union Railway, whose shares are held in equal portions by the two Companies and which unites their lines, was constructed. As the result of this undertaking, its terminus was transferred in 1876 from Bridge Street on the south side of the Clyde to the large station at St Enoch's Square, on the north side of the river. In 1912 its mileage had risen to 466 miles, the number of passengers and the tonnage of minerals and

goods carried to 16,328,321 and 8,842,452, and the receipts to just over two millions.

The Great North of Scotland radiates from Aberdeen throughout the counties of Aberdeen, Banff, Elgin, and part of Inverness. The first portion of what ultimately became the Great North system to be completed was, however, the line from Elgin to Lossiemouth, which was opened in 1852. It was only in this year that the construction of the main line northwestwards was begun and four years elapsed before it was completed as far as Keith. From Keith it was extended south-westwards for a distance of 48 miles to Craigellachie and later along the Spey valley to Boat of Garten—101 miles from Aberdeen—which is the terminus in this direction and where it comes into touch with the Highland line. From Craigellachie the Morayshire line, which was authorised in 1846 and amalgamated with the Great North in 1880, provided a connection northwards to Elgin, from which the coast route, finished in 1886 runs eastwards along the Moray Firth to Portsoy and then sweeps inland by Tillynaught to join the main line at Grange, between Keith and Huntly, with a branch from Tillynaught to Banff. This coast line is now the main through line by the Great North from Aberdeen to Inverness. Within the limits of Aberdeenshire there are three main branches from the main line—the Buchan branch from Dyce to Fraserburgh, completed in 1865, with sub-branches from Ellon to Cruden Bay, opened in 1897, and from Maud to Peterhead, completed in 1865; the Don valley branch from Kintore up the Don to Alford, completed in 1859; and the Turriff and Macduff branch from Inveramsie, completed in 1860. From Aberdeen the Deeside line runs westwards up the Dee valley to Banchory, Aboyne, and Ballater, to which it was continued in three successive instalments between 1852 and 1866. In the latter year it was leased to the Great North, and ten years later amalgamated with it. The whole system serves a rich agricultural country, with many prosperous fishing towns and villages along the coast, and its goods traffic consists mainly of agricultural produce, cattle, dead meat, and fish. On the Deeside and Speyside sections there is also a considerable tourist traffic to the summer resorts in these beautiful Highland valleys. The station at

Aberdeen is jointly owned with the Caledonian and has been greatly enlarged in recent years.

For long its passenger service was a vexation to the traveller. In the early " eighties " it had no express trains, and many of them carried both goods and passengers. The journey from Aberdeen to Elgin, for instance—a distance of 80 miles—took at least 4¼ hours. During the decade between 1880 and 1890 a marked improvement took place in the speed of its trains and in its locomotives and carriages. " The new stock," says Mr Acworth, " would do credit to any line in Great Britain." In 1912 its total mileage was 333 miles, the number of passengers carried was over 3¼ millions, the goods and mineral traffic amounted to over 1 million tons, and the receipts to £518,049. The paid up capital stood at £7,661,825.

The fifth of the great Scottish railways—the Highland—originated with the opening of the line from Inverness to Nairn—a distance of 15 miles—in 1855. Three years later it was extended to Keith by the company bearing the name of the Inverness and Aberdeen Junction Railway. Another extension was made northwards from Inverness by the Inverness and Ross-shire Company to Dingwall and Invergordon between 1861 and 1863, the two companies having been meanwhile amalgamated. A further extension brought the line to Bonar Bridge, and thence to Golspie, Helmsdale, Wick, and Thurso by various undertakings which were amalgamated with the larger company in 1884. Four years earlier the amalgamation of the Dingwall and Skye line extended its jurisdiction to Stromc Ferry and subsequently to Kyleackin in the west. Meanwhile the Inverness and Perth Junction Railway from Forres to Dunkeld, to connect with the Perth and Dunkeld line, opened in 1856, had been sanctioned in 1861. The distance of 112 miles was completed in 1863 when an amalgamation took place with the Perth and Dunkeld. Two years later the whole of these northern lines so far constructed were united under the name of the Highland Railway, which, in consequence of the additions subsequently made, attained a length of 507 miles. The most important of these additions was the direct connection between Aviemore northwestwards across the Findhorn and Nairn valleys to Inverness, the viaduct across

the Nairn river being 600 yards long, that across the Findhorn 390. The line from Dunkeld to Inverness, via Aviemore, runs through some of the grandest scenery in the Highlands, and attains at Drummochter, the pass into the upper Spey valley (1,484 feet) the highest railway altitude in Great Britain. Owing to the drifting snow in winter the snow plough is often requisitioned to make a passage through the drifts off the moors and the mountain sides on to the line in spite of the double walls of raised sleepers by which it is guarded in many places. A considerable proportion of its course, however, passes through the fertile regions bounding the Moray Firth, with its adjuncts the Beauly Firth and the Cromarty and Dornoch Firths. From Perth onwards its tourist traffic is very heavy in summer. Next to this traffic, the carriage of sheep, cattle, fish, timber, and agricultural produce is its mainstay. Though the number of passengers and the tonnage of goods carried in 1912 were less than those on the Great North (2 million odds and 600,000 tons odds respectively) the receipts, £574,590, were considerably larger on a paid up capital of just under 7 millions.

The statistics relative to each of the five main Scottish railways are very significant of the progress of railway enterprise in Scotland during the last fifty years. This progress will appear still more striking from a comparison of the figures for the whole of them during this period. In 1864 the total mileage amounted to 1720. In 1912 it had swelled (including the Portpatrick and Wigtownshire joint line, 82 miles long), to 3,627. The total capital similarly rose from about 47¾ millions to close on 185 millions, the number of passengers from over 20 millions to close on 89 millions, the tonnage of goods and minerals from nearly 18 millions to nearly 67 millions, the receipts from all sources from about 3¾ millions to nearly 18½ millions.

A marked feature of Scottish railway history has been the keen spirit of competition between the various companies for possession of the traffic in districts in which two or more lines operate, especially in the central region, in which population and industry are so largely concentrated. A large part of this history has been concerned with the battle for predominance or monopoly, and this has been especially the case with the North British and

Caledonian. Construction was long partly dominated by this motive. Happily there is now a tendency to adopt a more pacific policy, if only in virtue of self interest. The fierce and reckless competition has proved to be a policy that does not pay, and agreements of various kinds, such as interchange of railway tickets where the railways serve the same towns, have been adopted in order to mitigate it. Another noteworthy feature has been the amalgamation of local lines by the larger companies in order to facilitate through traffic between the larger towns in Scotland itself and between Scotland and England. Hence the development of the main lines by the eastern, central, and western routes from the Border to Glasgow, Edinburgh, Perth, to Dundee, Aberdeen, and Inverness. The result has been a great advance in expeditious travelling and goods transit. For instance, a passenger can travel from Edinburgh to Glasgow in about an hour by the North British or the Caledonian, transact business, and return within a single forenoon. Or, he can leave Edinburgh in the morning, travel to Aberdeen by the Forth and Tay bridges, in about three hours and twenty minutes, transact business in the northern city, and be back in Edinburgh in the late afternoon, or early evening. Still more wonderful, he can travel to London by a train leaving Edinburgh at 7.45 in the morning, arrive at 4.10 p.m., transact business in the late afternoon, and even go to the theatre in the evening, leave London at 11.30, and be back in Edinburgh at 7.15 in the morning, within the twenty-four hours. Equally noteworthy has been the improvement in the rolling stock. In 1864 the largest locomotive in full working order weighed about 60 tons. In 1912 the weight had been doubled. Similarly the heaviest carriages weighed 18 tons, were 24 feet long, and rested on four wheels. To-day the dining cars are 66 feet long, weigh 44 tons, and have six bogie wheels at each end. In the same interval goods waggons have increased in weight from 5 tons with a carrying capacity of 6 tons, and 15 feet in length, to 7 tons with a capacity of 16 tons and a length of 20 feet.

Railway extension as well as the increase in shipping has given a great impulse to the construction of docks and harbours. Both the North British and the Caledonian own large docks in the

Firth of Forth—the Caledonian at Grangemouth and South Alloa, the North British at Alloa, Bo'ness, Burntisland, and Methil, which serve as outlets for the export of coal from the Fife coalfields. The Methil docks are three in number and cover 27 acres. At Grangemouth the Caledonian built a new dock in 1876 several acres in extent and 24 feet deep, and in 1906 added a second about 30 acres in extent and about 30 feet deep to cope with the coal export trade from the Lanarkshire mines. On the west coast there are railway docks of smaller extent at Ayr, Troon, and Ardrossan.

The development of railway enterprise adversely affected canal extension in Scotland, and only in the more inaccessible western region has this form of communication proved of much service. The Crinan Canal, constructed during the last years of the eighteenth century at a cost of £100,000, provides expeditious passenger transit by steamer from the Clyde to Oban. It has long been an important highway for summer tourist traffic, but is unsuited for the passage of cargo steamers of any size. For this purpose it would require to be enlarged and the project of improving it has been pressed in recent years in the interest of trade between Glasgow and the Western Highlands. "The Canal," urges the County Council of Argyll, "is situated on the shortest, most direct, and most sheltered route between the Clyde and Western Highlands; but on account of its insufficiency that route is not available for the larger vessels that provide modern means of transit. . . . The construction of a Crinan Ship Canal, available at all states of tide, and capable of passing expeditiously the largest steamer trading to the Highlands, would be of the very greatest benefit to the district by cheapening and accelerating communication with Clyde ports. And the bringing of the entire district into closer touch with, and 85 miles nearer to, its southern market, would do much to arrest the serious depopulation now in progress, and would greatly help to develop new industries."

In 1773 James Watt prepared plans for the construction of a canal through Glenmore—the great strath that runs north-eastwards from Loch Linnhe to the Moray Firth—to provide a through passage for large vessels from the Atlantic to the North

Sea and *vice versa*. His estimate of £165,000 was deemed too formidable to be faced by the projectors, and nearly thirty years elapsed before the project was resumed. In 1803 the work was begun under the direction of the engineers Telford and Jessop, and in 1822 it was opened at a cost of £885,000. It was finally completed in 1843-47 and cost £1,311,270. Though in ordinary times it carries a considerable goods and tourist traffic and during the war proved serviceable as a line of communication with the American naval base at Inverness, it has failed to become a highway for deep sea vessels between the eastern and the western seas. The idea of providing such a waterway has recently taken the form of a project to construct a new canal between the Forth and the Clyde. The deepening of the present canal is deemed impracticable on account of the 90 feet summit which would involve the construction of at least six locks—three at either end —by which to lift the largest battleships and steamers. Moreover the deepening of the Clyde at Yoker, across the tide, to at least 36 feet and the maintenance of the channel is regarded as another insuperable objection. The advocates of the proposed deep sea canal, therefore, prefer a new route from Grangemouth via Stirling, Loch Lomond, and Loch Long, which would maintain the Loch Lomond level all through, and would require only one 21 feet lock at either end. The estimated cost—20 millions —is very formidable. But its supporters point to the fact that Germany spent an equally large sum in the construction of the canal between Kiel and the mouth of the Elbe, and that the Manchester Ship Canal cost £17,000,000. In support of the expenditure of this large sum they adduce the commercial and strategical advantages which would accrue from such a waterway. It would, they contend, greatly add to the mobility of the Fleet by ensuring the rapid transfer of war vessels from the North Sea to the Atlantic and *vice versa*, and would bring the Naval Base at Rosyth into touch with the repairing yards on the Clyde. It would thus materially add to the national safety. It would, moreover, provide a much shorter route between the ports of the east and the west coasts and between those of the north of Europe and the north Atlantic. The canal would thus have the double advantage of serving important strategical and commer-

cial ends, and they are confident that the traffic returns and the impulse given to the trade of the ports affected by it would more than compensate for the initial capital outlay. Despite these sanguine deductions the scheme, like the Channel Tunnel, has not yet got beyond the stage of discussion, though the arguments in its favour appear to be worthy of serious consideration.

8. Commercial Enterprise

The progress of modern commerce has been enormously facilitated by improved transport. The raw materials, imported by steamship, are expeditiously distributed by railway to the manufacturing centres. Coal, the first requisite of production, can easily be carried to these centres in the large quantities necessary to keep the factories working. The manufactured goods, for home consumption and export, can be as easily transported to their inland destinations, or to the seaports for shipment. Road transport has also been greatly developed in recent years by the advent of steam and especially motor lorries and vans. These advantages are palpable to everyone to-day. In the days when railway enterprise was but a problematic experiment, they were not so obvious. Mr Charles MacLaren wrote a series of papers in *The Scotsman* of December, 1824, in which he foretold the possibilities of railway locomotion and the social and commercial effects of such locomotion, with remarkable foresight. His forecast was received with scepticism, and he was regarded as a presumptuous visionary by some of his critics. Time, however, ere long proved him to be a true prophet. "We cannot scan the future march of improvement; and it would be rash to say that even a higher velocity than 20 miles an hour may not be found applicable. Tiberius travelled 200 miles in two days, and this was reckoned an extraordinary effort. But in our times a shopkeeper or mechanic travels twice as fast as the Roman emperor, and twenty years hence he may probably travel with a speed that would leave the fleetest courser behind. Such a new power of locomotion cannot be introduced without working a vast change in the state of society. With so great a

facility and celerity of communication, the provincial towns of an empire would become so many suburbs of the metropolis—or rather, the effect would be similar to that of collecting the whole inhabitants into one city. Commodities, inventions, discoveries, opinions would circulate with a rapidity hitherto unknown, and, above all, the intercourse of man with man, nation with nation, and province with province would be prodigiously increased."

Other factors besides the marvellous development of transport facilities have contributed to the vast commercial advance of the last 100 years. Among these, not the least effective was the introduction of Rowland Hill's scheme of the penny postage in 1840, which reduced the cost of conveying an ordinary letter within the United Kingdom to one penny, irrespective of the distance traversed. Still more effective was the introduction of electric communication by means of the telegraph and the telephone. The invention of the electric telegraph was the result of many tentative efforts to communicate intelligence by electric means, and the problem was at last practically solved by Messrs Wheatstone and Cook in England, who improved the needle telegraph between 1837 and 1845, and by Mr Morse in America, who, in 1836, produced the electro-magnetic recorder. Both systems subsequently underwent improvements and modifications, and the telegraph not only vastly facilitated intercourse in individual lands and between adjacent countries, but by the laying of undersea cables brought the old world into close touch with the new, and finally interlinked all the nations of the world. The laying of the first submarine cable—that between France and England—was successfully accomplished in 1851, and in 1866, after a couple of unsuccessful attempts, the *Great Eastern* at last accomplished the feat of connecting England and America by cable telegraph laid on the bed of the Atlantic. Ten years later, Mr Graham Bell, a Scotsman domiciled in America, succeeded in conveying speech by the invention of the telephone, which was publicly exhibited for the first time at Philadelphia in 1876, and before the British Association in England in the same year. In this year an improvement of it was brought out by Mr Edison. The most marvellous form of electric communication

—that of wireless telegraphy—was achieved by Signor Marconi about twenty years later. The flying machine, in the form of the airship and the aeroplane, whose wonderful advent belongs to the twentieth century, has already become a mechanical commonplace. Its capabilities as a means of communication have been brilliantly demonstrated by the achievements of the Flying Forces of the belligerents of the great war, and by the airship and aeroplane flights across the Atlantic, and the aeroplane voyage from England to Australia successfully achieved at the end of 1919 by the brothers Ross and Keith Smith. Mail and passenger services have followed the aerial operations of the war and the commercial possibilities of the flying machine, though still limited, are not to be gauged by what has actually been achieved in this direction.

The organisation of commerce has undergone a marked development in the course of the last 100 years. The old leisurely methods of the eighteenth century, by which business was transacted in the back shop of the dealer, or in the tavern near, has long gone out of vogue. Competition has necessitated organising talent and pushful initiative in the successful trader, large and small, to a degree undreamt of by our great-grandfathers. Even the ordinary retailer finds it necessary to keep himself within the purview of his customers, and in the case of the provision trade at least, it is not unusual to call for orders for the day's supply. The goods ordered have to be delivered at the customer's residence, and a vast system of transport between shop and dwelling is maintained in the larger towns. The advertisement or the printed catalogue has become an essential of many branches of trade and a whole army of commercial travellers is ever on the move throughout the land, whose special business it is to obtain orders for the wholesale houses from the retail merchants. Another feature is the growth of large establishments, which deal in certain classes of goods and absorb a vast amount of the trade formerly in the hands of the small retailer. These establishments are often run by limited liability companies and the profits disbursed in the form of dividends to their shareholders. Many of these have branches all over the country, and the management of these large concerns is a task

demanding great administrative ability. Their extensive overturn has militated seriously against the small trader, who finds it ever more difficult to maintain himself against their powerful competition. Another form of the same tendency is the combination of merchants or manufacturers in the same line of business with the object of fostering overturn and regulating prices, by no means to the advantage of the consumer. The sinister term " profiteering " has not unjustly come to be applied to this sort of tactics which during, and even after the war, has swelled the dividends of too many of these concerns to an excessive extent.

The development of industry has enormously added not only to the quantity, but to the variety of marketable goods and has given rise to a corresponding increase in the number of specific wholesale and retail trades.

Another remarkable feature of the commercial history of the nineteenth century has been the application of the co-operative principle and the rise and extension of co-operative trading societies all over the land. The movement in Scotland dates from the later eighteenth century. The first store on the co-operative principle, as far as our knowledge goes, seems to have been started at Fenwick in Ayrshire in 1769 by the weavers of the village, and dealt chiefly in oatmeal. Another was formed by the weavers of Govan in 1777, and continued to exist till 1909; a third, which still survives, by the same craftsmen at Lennoxtown, in Stirlingshire, in 1812. Others of these early associations ere long collapsed, but the Larkhall Society, which was started in 1821, also survived to the present time. During the next thirty years societies came into existence at Glasgow, Bannockburn, Cadder, Paisley, Muirkirk, Darvel, Leven, Leslie, Kingskettle, Menstrie, Alva, Tillicoultry, Arbroath, Brechin, Kirriemuir, Galashiels, Hawick, Selkirk. These early societies aimed for the most part only at selling goods to their members at cost price, plus the extra charge for expenses of management, though some of them also divided the profits in proportion to the number of shares held by the members. A great impulse was given to the movement by the adoption of the principle of dividing the profits among the members in accord-

ance with the amount of their purchases. The advocacy of this idea is claimed for Mr Alexander Campbell, of Glasgow, who was an ardent missionary of Robert Owen's scheme of social reform on communal lines. The movement received the sanction of Parliament in 1852, in the Industrial and Provident Societies Act, which was amended and extended by subsequent acts, that of 1893 exempting them from income tax, provided the Society does not sell to persons who are not members and that the number of its shares is not limited. This exemption is resented by the private trader as an unfair handicap, on the ground that a trading concern which distributes profits that are not subject to income tax has an advantage, in the matter of prices, over one whose profits are subject to this charge. From 1857 to 1863 a great extension of the movement took place. Among the more notable of the new ventures were the Paisley Equitable, the Paisley Provident, and the Paisley Manufacturing, the Glasgow Co-operative which, however, collapsed in 1865, owing to a too reckless extension of branches; St Cuthbert's, Edinburgh—now the largest in Scotland, with a membership of nearly 40,000 in 1909; the St Rollox, Glasgow, the Glasgow Eastern, the Barrhead Society, the Kilmarnock Equitable, the Dumbarton Equitable, the Lanark Provident, the Aberdeen Northern, the Edinburgh Northern District—later amalgamated with St Cuthbert's —the Alloa, and Dunfermline Societies. By 1866 there were as many as 120 societies on the list of the Registrar of Friendly Societies in Scotland, and many more were in existence, though not registered. The next important step was the establishment of the Scottish Wholesale Society for the supply of the retail co-operative trade throughout the country. It was started in Glasgow in 1868 under a committee representing a number of societies, which undertook to purchase their goods from it. Thus was launched the policy of co-operative production, which has grown to such large dimensions in the works at Shieldhall for the manufacture of a large variety of goods, the Chancelot Flour Mills at Edinburgh, the Ettrick Tweed Mills at Selkirk, and the Calderwood Estate for fruit growing. Its capital in 1909 was over $3\frac{1}{3}$ millions, sales close on $7\frac{1}{2}$ millions, and the net profit close on £280,000.

The growth of the co-operative movement may be best gauged by a comparison of the statistics relative to it in the years 1886 and 1909. In the former year the number of societies was 311, including the Wholesale Society, with a total membership of 137,047, a total share capital of £854,839, and a total net profit of £609,557. In the latter year the number of societies had fallen to 294 (again including the Wholesale Society), but the membership had swelled to 405,129, the total share capital to nearly 5¼ millions, and the total net profit to £2,852,785.

A very significant indication of the commercial and industrial progress of the country is the marked increase of population and the growth of towns in the nineteenth century. The total population of Scotland in 1801 was in round numbers 1,608,000. Fifty years later it was close on 3 millions, with 2,888,000 in 1851. The next fifty years saw it steadily rise to nearly 4½ millions, with 4,472,000 in 1901. At the end of the first decade of the twentieth century the total was 4¾ millions, with 4,760,000. At the beginning of the nineteenth century (1801) no Scottish town had a population of 100,000. The inhabitants of Glasgow, with suburbs, totalled in round numbers 81,000. It was then surpassed by Edinburgh and Leith (practically one city, though under separate administrations) with 83,000. Dundee had only 26,000, Aberdeen 18,000, Paisley and Greenock each 17,000, Perth 15,000, and Dunfermline 10,000. All the others fell below the last figure. In the middle of the century (1851) Glasgow, with suburbs, had risen to 345,000, Edinburgh and Leith to 194,000, Dundee to 61,000, Aberdeen to 54,000, Paisley to 32,000, Greenock to 37,000, whilst Perth remained stationary, and Dunfermline had fallen to 9,000. Kilmarnock, on the other hand, had increased from below 10,000 to 19,000, and Hamilton and Inverness had risen each to 10,000. Fifty years later (1901), Glasgow, with suburbs, had reached a total of 910,000, Edinburgh-Leith 393,000, Dundee 161,000, Aberdeen 153,000, Paisley 79,000, Greenock 68,000. Coatbridge, Kilmarnock, Kirkcaldy, Hamilton, Perth, Motherwell ranged between 37,000 and 30,000, whilst seven more—Falkirk, Ayr, Dunfermline, Arbroath, Airdrie, Inverness, Wishaw—were between 29,000 and 21,000. The extension of the Glasgow city boundary in 1912 raised the

population to over a million, and in 1919 it was estimated to have increased to 1,114,656. By the extension of the Edinburgh boundary in 1920, so as to include, besides Leith, a large landward district, that of the capital now approaches half a million. The other burghs also showed substantial increases at the census of 1911, Dundee, for instance, rising to fully 165,000; Aberdeen to nearly 164,000; Paisley to 84,455; Greenock to fully 75,000; Coatbridge to fully 48,000. The estimates for all these, as well as other burghs, towards the end of the last decade show further substantial advances.

A more direct indication of the growth of trade is afforded by the increase in the tonnage of the vessels entering and sailing from Scottish ports, and in the value of imported and exported goods carried by them. In 1851 the total tonnage entering and clearing from Scottish ports and engaged in the coasting, colonial, and foreign trade was fully 5½ millions. In 1884 it had risen to close on 20 millions. Thirty years later, in 1913, the last pre-war year, the tonnage for Glasgow alone was close on 12½ millions, for Leith nearly 4¾ millions, for Greenock (including Port-Glasgow) 3¾ millions, for Grangemouth over 3 millions, Aberdeen 2¼ millions, Burntisland close on 2 millions, Dundee over 1½ millions, and Ardrossan nearly 1½ millions.

Equally significant is the rise in the value of imports and exports. In 1801 the figures were over 2½ millions and nearly 3 millions respectively; in 1851 nearly 9 millions and fully 5 millions; in 1883 nearly 38 millions and 21 millions. Thirty years later the amount for Glasgow alone was nearly 18½ millions and over 36 millions, for Leith about 15¾ millions and 7¼ millions, Grangemouth, fully 6 millions and 3 millions, Dundee over 8 millions and 1½ millions, whilst the value of combined imports and exports was nearly 2 millions each in the case of Aberdeen and Methil, and over 1¼ in the case of Burntisland. Another striking testimony to the progress of the shipping trade is afforded by the harbour revenue of the greatest of the Scottish ports. In 1808 this revenue amounted to about £5,500; from July, 1910 to the 30th June, 1911, it was £577,322.

In addition there has to be reckoned the value of the goods produced and distributed within the country for which no figures

are available, but which would greatly enhance the total value of its commerce. Perhaps one may best realise this vast activity in production and exchange, which go to the making of modern commerce, by taking a railway journey which carries the traveller past one or more large goods stations, with many miles of rails and countless goods trains arriving or departing, or passing through. The work of transport to and from factory and warehouse, field and mine, harbour and dock, goes on day and night, with the partial exception of Sunday. And this work is not confined to the large railway centres, though it is displayed there on the grand scale. Every country station has its goods siding, and the goods traffic of these countless stations in the aggregate represents an enormous additional commerce. In 1912 the total tonnage of goods and minerals carried on the Scottish railways was nearly 67 millions. Go back 100 years to the days of road transport—the days of the carrier and the hawker—and what a vast and complex commercial advance does the contrast reveal! Even within the period of railway transport the increase in the exchange of goods, represented by this transport, has been colossal. In 1864 the tonnage of goods and minerals carried was a little below 18 millions. In 1884 it was very nearly double, with fully 35½ millions. In 1904 it was nearly 65 millions; eight years later it was nearly 67 millions.

Commerce is liable to fluctuations between prosperity and depression, as the London Bankers' Clearing House and the railway returns, for instance, show. These fluctuations recur in cycles. At a certain period prices begin to fall below those prevailing for some time. This fall lasts for a longer or shorter period, when they begin to rise in the case of certain commodities, and the rise extends to others, until it becomes general. The ascending movement lasts for a certain time, to be followed by the reverse process. War, rash speculation, over-production, over-trading tend to affect industry and commerce, imparting an artificial stimulus to be followed by the inevitable reaction. To these influences has to be added that of strikes, which not only disorganise and diminish the particular industry affected, but adversely react on the whole trade of the country.

Apart from the ordinary ebb and flow of trade there were in

the nineteenth century a series of commercial crises, with disastrous effects for the time being. In the years 1823-26 the crisis was largely brought about by the mania for forming joint stock companies of all kinds. " It was," says Lord Cockburn, " the period of the most violent joint stock mania that ever seized this kingdom, the newspapers of the day containing little else than advertisements and recommendations of joint stock companies." It was less disastrous in Scotland than in England. Whilst more than eighty of the English banks suspended payment, only three of the smaller Scottish banks—the Caithness Banking Company, the Stirling Banking Company, and the Fife Banking Company —collapsed. Several years of depression followed, and there were not a few failures. " To such an extent was this depression felt in Dundee," notes Mr Mackenzie in *The Scottish Bankers Magazine* of April, 1909, " that the banks in some cases were obliged to receive payment in kind of their debts, the acceptors of bills tendering cloth when they had no money wherewith to pay." The crisis of 1847 was largely due to the railway mania. Schemes for constructing hundreds of railways were launched in 1845-46 and a credulous public recklessly invested its money in these impossible ventures, only to realise too late that it had been swindled for the most part. The ill effects of this rash railway speculation were aggravated by the bad season of 1846, which destroyed the crops in the United Kingdom and raised the price of wheat to 120s. per quarter. Corn merchants made large purchases in foreign countries in the hope of selling with a large profit. The arrival of these imports and the prospect of a good harvest in the following season led to a fall in prices, wheat dropping to about 60s. per quarter. The result was a large number of failures, which seriously affected Scottish as well as English trade, especially that of Glasgow.

Several years of prosperity preceded the crisis of 1857, which embraced America as well as Europe. British exports had been doubled between 1848 and 1857, rising from about 60 millions to fully 122 millions. Over-trading produced the inevitable reaction in America, which affected disastrously the trade of the United Kingdom. " The first occurrence which caused alarm in Scotland was the failure of the house of McDonald & Co., of

Glasgow, well-known merchants in that city, who had a large connection. This failure was soon followed by that of Monteith & Co., and Wallace & Co., two other Glasgow firms. It was well known that all these houses were largely indebted to the Western Bank, and this knowledge produced a feeling of distrust in the management and soundness of that institution. This uneasiness was evidenced by a rapid decline in the price of the bank's stock, and a continuous withdrawal of deposits. On account of the crisis in the United States, and the bank's connections with business houses in that quarter, it was at the same time greatly incommoded through the failure of remittances to meet its acceptances under credits." On the 9th November, 1857, the bank, being unable to meet its liabilities, which amounted to nearly $10\frac{3}{4}$ millions, suspended payment and afterwards went into voluntary liquidation. On the following day the City of Glasgow Bank was also forced to close its doors, though in this case the suspension proved to be only temporary. A third bank—the Edinburgh and Glasgow—only escaped disaster by amalgamating with the Clydesdale Bank. "Great depression existed in the country for some time in consequence of the failure of the Western Bank. Much distress arose, especially in Glasgow and other places in the west, owing to the failures which took place and the number of people thrown out of employment."

The next serious crisis was that of 1878, which was occasioned by the failure of the City of Glasgow Bank. In this case the crash was not caused by inflation and over-trading, but by the unsound and dishonest business methods of the directors of the bank, who had not only made advances, amounting to nearly 6 millions to four firms, but some of whom fraudulently manipulated the bank's accounts so as to conceal from the shareholders and the public the actual state of affairs. After an ineffectual attempt to obtain a loan from the other banks, it was forced to suspend payment on the 2nd October, 1878, with liabilities, exclusive of capital, of nearly $12\frac{1}{2}$ millions. As in the previous case of the Western Bank, the unfortunate shareholders, in virtue of their unlimited liability, were called on to make up the deficiency in the assets, which amounted to £5,190,000. Only a fraction of their number remained after the deficiency had been

met, the greater number were absolutely ruined, and so widespread and crushing was the effect that a relief fund was opened, which realised £40,000. Failures were numerous and a protracted period of trade depression followed. A number of the directors were tried and imprisoned for fraud. In order to restore confidence, the Scottish Banks adopted the practice of having their accounts and balance sheets audited by professional accountants and registering under the Act of 1879 as limited liability companies.

The operations of the banks afford a good test of the commercial enterprise of the country. "Commercial activity," says Mr Milne in *The Scottish Bankers Magazine*, October, 1913, "is reflected with a fair amount of accuracy in the mirror of banking statistics. In 1901-2 the deposits in the Scottish banks amounted to 107⅓ millions. In 1916-17 they reached the total of 166½ millions, an increase of fully 59 millions. In 1901-2 acceptances and drafts totalled nearly 5½ millions; in 1916-17 nearly 8½ millions. Banking advances in 1901-2 were fully 74 millions; in 1916-17 they had risen by fully 20 millions to over 95 millions. Banking profits are another indication of the extent of commercial transactions. In 1901-2 the net profits of all the Scottish banks were £1,664,109; in 1916-17 they were fully 2 millions. The total for the period from 1865 to 1897 was over 39 millions, and for the next twelve years up to 1908 nearly 20 millions more, or well-nigh 60 millions for these 45 years."

Bank deposits represent only a certain proportion of the profits of industry and commerce. Investments in joint stock companies absorb a large amount of the available capital of any one year of those who prefer a higher, though less safe interest to that yielded by the banks for deposits. The paid up capital of limited companies in Scotland, exclusive of railways and tramways, rose, for instance, from about 127½ millions in 1901 to about 189¾ millions in 1911—an increase of about 62 millions in ten years. In the latter year, therefore, practically £40 per head of the population of Scotland was employed in the trade of the country by means of joint stock enterprises.

A more modest, but still significant indication of increasing industrial and commercial activity is afforded by the savings of

the working classes as shown by the statistics of the Trustee Saving Banks, established in 1817, and the Post Office Saving Banks established in 1861. In 1864 the amount due to depositors in the Scottish Trustee Saving Banks was £2,221,001; in 1883, £7,359,586; in 1894, £11,390,491; in 1904, £17,754,659; in 1914, £20,538,432, the number of depositors in the last mentioned year being 618,633. From 1894 to 1914 the amount in the case of the Post Office Saving Banks rose from fully $2\frac{3}{4}$ millions to nearly $8\frac{1}{2}$ millions.

The Scottish Fisheries constitute an important element in Scottish industry and commerce. They received a great impulse from the establishment of the Fishery Commissioners, who were authorised by Act of Parliament in 1807 to grant bounties on all fishing vessels from 50 to 100 tons and 2s. per barrel of fish cured on shore and 2s. 8d. additional on each barrel exported, to take measures for the improved gutting and packing of fish, and to appoint officers at the fishing ports to supervise the industry. These Commissioners were superseded in 1882 by the Fishery Board of Scotland, with increased powers. During the next twenty years, after the passing of the Act, the policy of granting bounties was so effective that it was found unnecessary to continue the system after 1830. Whilst in 1807 the quantity of herrings cured was 90,185 barrels, of which 35,848 were exported, the number in 1820 had risen to 442,195 and 294,805 respectively. The herring fishing is the most extensive. Originally it was chiefly prosecuted on the West Coast, particularly the Firth of Clyde, and in 1816, 510 of the 726 boats engaged in it belonged to this region. Ten years later the lead had passed to the East Coast, and Eyemouth, Newhaven, Anstruther, Montrose, Stonehaven, Aberdeen, Peterhead, Fraserburgh, the Moray Firth ports, Wick, and Orkney and Shetland became important centres of the industry, Wick long taking the leading place. On the West Coast, Stornoway, Lochbroom, Campbelltown, also developed into important centres of the industry. For the growing yearly catch accruing from this development, Ireland and the West Indies were the chief markets. The abolition of slavery in the Indies proved adverse to the export thither, which fell from 67,000 barrels to less than 5,000, and the Scottish curers turned

for a market to the Baltic ports, where Scottish cured herring successfully competed with the Dutch. So considerable had the industry become by the middle of the nineteenth century that new harbours were constructed and the old ones enlarged, and larger boats were built during the next twenty years. Already in 1850 there were fully 66,000 persons employed in connection with it, and though the season lasted only eight or ten weeks (July-September), many of these found employment throughout the year as carpenters and barrel-makers, rope, sail, and net-makers, etc. Its progress may also be gauged by the increasing size of the boats engaged in it. In the early part of the century they were from 24 to 28 feet keel, were usually manned by five men, and carried from twelve to fifteen nets. They were ere long enlarged to from 32 to 36 feet, and carried from thirty to thirty-five nets. Between 1860 and 1870 came the decked boat, and the introduction of a winch to hoist the sails and masts and haul the nets, and later of the steam capstan led to a further increase in the size of the boats, many of which are now driven by motor power, to from 60 to 65 feet keel. About 1880 the steam trawler made its appearance, and in spite of the Act prohibiting the trawlers from fishing within three miles of the shore and the closing of the Firths of Forth and Clyde, and the Moray Firth, trawling has greatly increased. In 1890 there were 47 trawlers at work; in 1900 they had increased to 232, and in 1910 to 819. The steam drifter also made its appearance, and their number rose from 70 in 1900 to 1,167 in 1910. In the latter year the number of sailing boats had fallen to 8,296 from 14,284 in 1890, the total vessels of all kinds engaged in the industry being about 10,000, valued at nearly 5¾ millions.

Next in importance to the herring fishing is the "white fishing," embracing cod, ling, haddock, sole, halibut, etc., and especially famous are the cured or "Finnan Haddies" of the Aberdeenshire and Banffshire coasts. The old method of fishing with baited lines for cod and other white fish has been largely superseded by the beam trawl net. Shell fish are caught in considerable quantities, and the salmon fisheries in the estuaries of the Scottish rivers are very productive. Whale fishing, on the other hand, which was formerly prosecuted from Dundee, Aber-

deen, Peterhead, and other East Coast ports, has declined since about the middle of the nineteenth century.

As showing the growth of the herring curing industry during the first three-quarters of the nineteenth century, it is significant that the number of barrels of cured herrings rose from 111,519 in 1812 to over a million in 1874. In 1880 the number stood at 1,473,600, and though the catch is liable to fluctuation, the increase, taking the average, has been substantial. The export trade shows a similar rise from 62,820 barrels in 1812 to nearly three-quarters of a million in 1874 and fully a million in 1880, the largest portion going to the Baltic ports for Germany and Russia. In addition a vast quantity is sold fresh for home consumption. The total catch of herrings and other kinds of fish is given in hundredweights in the official statistics for later years. From 1887 to 1913 the hundredweights of herring landed vary annually from 3 millions to nearly 6 millions, and in 1907 the number was fully 6¼ millions. In 1913 it was 4½ millions. The total for fish of all kinds (excluding shell fish) during the same period varies from 5 to nearly 9 million hundredweights and in 1907 the 9 millions were overpassed. Similarly, the value of herring sold during the period rose from £641,572 in 1887 to over 2 millions in 1913, and the total value of fish of all kinds from £1,330,394 to close on 4 millions, the highest total reached within the period. The number of persons engaged in the industry is about 90,000, of whom 40 per cent. are fishermen, 25 per cent. curers and their employees, the remainder fishmongers, boat builders, etc. In 1900 the total capital invested in boats, nets, and other gear in Scotland amounted to about £1,605,900. In 1914 it had risen to over 3½ millions.

9. The Scottish Trade Union Movement

The progress of industry led to the formation of associations or combinations of workmen for the protection of their interests. Hence the rise of Trade Unions, which became so characteristic a feature of the industrial life of the nineteenth century. The movement dates from the previous century and was thus con-

temporaneous with the rise of the capitalist manufacturing class and the factory system, which conjointly tended to transform the small craftsman in many industries, who previously worked on his own account, into a wage-earner pure and simple. " In all cases," remark Mr and Mrs Sidney Webb in their *History of Trade Unionism*, " in which Trade Unions arose, the great bulk of the workers had ceased to be independent producers, themselves controlling the processes and owning the material and the product of their labour, and had passed into the condition of life-long wage-earners, possessing neither the instruments of production nor the commodity in its finished state." Under the old economic system laws had been made in the reigns of Elizabeth of England and James VI. of Scotland empowering the magistrates to fix the wages of all craftsmen and regulate the number of apprentices in each craft. Under the new system, by which the control of industry was more and more passing into the hands of the capitalist manufacturer and the workman was more and more becoming a pure wage-earner, the employers strove in their own interest to get rid of the old regulation of wages and labour and vindicate their claim to fix wages and employ labour irrespective of such statutory restrictions. They found in the teaching of Adam Smith a theoretic vindication of the principle of industrial liberty and were not slow to appeal to it in support of the policy of unrestricted wages and free labour. The effect of this policy was to cheapen labour, and it accordingly gave rise to a long series of industrial disputes and disturbances. The workmen naturally sought a remedy in combination to secure by means of the intervention of Parliament, or the Court of Session, or of strikes, better conditions of labour. Already, in 1782, the Scottish cotton weavers had combined in a union for this object. Cotton weaving and spinning required no lengthy training or particular skill on the part of the worker, and higher wages in this industry attracted a large number of agricultural labourers. The manufacturers combined to take advantage of the influx to reduce the " prices " or wage paid to the weavers for certain kinds of piece-work. The weavers in self defence combined to draw up a counter scale, and negotiations with the masters having failed, refused to work for the more

obnoxious of them. They thus adopted the expedient of the strike in order to enforce the acceptance of their terms and compelled those, who ultimately agreed to resume work at the masters' rates, to return or burn the cotton. Demonstrations in the streets of Glasgow led to a riot and a collision with the soldiers called out to maintain order, and several of the workmen were killed. A number of prosecutions ensued and the movement collapsed.

The growth of Trade Unionism among the textile workers of Yorkshire and Lancashire led to the passing of the Acts of 1799-1800, prohibiting combinations of both workmen and employers, and, in particular, rendering workmen who resorted to this expedient liable to three months' hard labour. These Acts did not, however, deprive the workmen of the right to use legal means for the protection of their interests. It was still open to them to combine for the purpose of presenting a case to the proper authority, which was empowered, in virtue of the old laws, to fix the scale of wages in industrial disputes. The Edinburgh compositors, for instance, are found adopting this expedient in 1804, when they presented a memorial to the Court of Session for an increase of wages in consequence of the rise of prices, and secured an " interlocutor " in 1805 fixing a scale for the printing trade of Edinburgh. Of this expedient the weavers made use some years later in the course of another dispute with the employers. In 1809 they joined those of Lancashire in an application to Parliament to limit the number of apprentices and fix a minimum wage. After investigation the Commons declined to interfere and a second application (this time by the Scottish weavers alone) was equally unsuccessful, the Select Committee adopting the manufacturers' view of the question of free agreement and declaring Parliamentary interference in such matters to be pernicious to the general interest. With wages at the scale of 8s. 6d. a week and the peck of meal at 3s., the weavers had, however, a strong case for such interference, and acting on the reminder of Lord President Hope that the magistrates possessed statutory powers to fix wages, they next appealed to the Provost and magistrates of the city. The municipal authorities also declined to interfere on the ground of an opinion of counsel that

they had no such authority. Fortified by a counter opinion in favour of their contention, the weavers next appealed to the Justices of the Peace for Lanarkshire, who required the employers to take into consideration a scheme of wages submitted by the workmen. The employers in turn appealed to the Court of Session, which upheld the action of the Justices, and ultimately in November, 1812, after an exhaustive examination of witnesses, the Court decided to recommend a scale varying from £1 to 8s. per week. But, with a few exceptions, the employers, who had withdrawn from the case, paid no heed to a decision which it had cost the weavers a large sum to obtain.

Thereupon the weavers decided on a general strike, which ere long involved 40,000 men all over the country. A strike was, however, a risky expedient in view of the Combination Acts, and the Lord Advocate now intervened on the side of the employers by arresting the leaders, in spite of the fact that the strikers in this case refrained from violence. This rather biassed intervention led to the collapse of the strike after a couple of months, and the leaders were in March, 1813, convicted and sentenced to various terms of imprisonment. A month later Parliament repealed the " pernicious " law empowering Justices to fix wages, and in the following year the statute empowering them to limit the number of apprentices (Statute of Apprentices), thus placing the workmen at the mercy of the employers. There was doubtless force in the contention that these laws were no longer in harmony with the principle of freedom of trade and labour which the manufacturers and their champions adduced in support of their abolition. But the impartial recognition of this principle would also have involved the recognition of the right of the workmen to combine to secure a reasonable remuneration for their labour out of the profits, to which labour as well as capital contributed. They were only too well justified in view of the poverty and privation induced by the long war with France, which hampered industry and raised prices, in demanding better conditions of labour. Unfortunately, the anti-democratic spirit of the governing classes throughout, and subsequent to the French Revolutionary period, was not disposed to give a fair consideration to the popular demands. Political prejudice, as well

as class interest, rendered it difficult for the working class to obtain a sympathetic hearing in a Parliament in which it had no representation, or even in the Courts of Justice, which were by no means free from the dominant political and class influences. Neither Parliament, nor law court, whilst ready enough to repress popular combination, took any steps to put down combinations of masters against their employees. Lawlessness was apparently deemed a monopoly of the working class, and a bitter sense of grievance was the result.

This embittered spirit inevitably found expression in acts of violence. In this spirit the Glasgow cotton spinners carried on the agitation which the weavers had failed to render effective by legitimate methods. The spinners had combined in a union in 1806, and from 1816 onwards they sought to gain their ends by terroristic methods. They not only made lavish use of threatening letters to obnoxious masters; they did not shrink from attempts at assassination and incendiarism, and bound their members on oath to make such attempts in the common interest. Between the years 1816 and 1824 several objectionable masters and workmen (the latter being known as " nobs ") were shot at. One woman was murdered and several persons were dreadfully injured by the vitriol thrown on them. The repressive policy which produced such outrages, the numerous prosecutions to which the combination laws gave rise, led Francis Place, a disciple of Bentham and James Mill, to begin an agitation for their repeal. He was joined by Joseph Hume and McCulloch, the editor of *The Scotsman*, and at length in 1824 they secured the support of Peel and Huskisson in carrying a repeal bill through Parliament. The employers were taken by surprise by the clever parliamentary tactics of the promoters of the bill and made an attempt to undo it in the following year. The attempt was only partially successful, for the Government, whilst repealing the Act of the previous year and prohibiting all combination for the purpose of coercing masters or workmen, explicitly excepted from prosecution associations for the purpose of regulating wages or hours of labour. In spite of this limitation the Act of 1825 constituted a real advance in the industrial emancipation of the working class. " The right of collective bargaining, involving the power to with-

hold labour from the market by concerted action," remark the Messrs Webb, " was for the first time expressly established. And although many struggles remained to be fought before the legal freedom of Trade Unionism was fully secured, no overt attempt has since been made to render illegal this first condition of Trade Union action."

This legislation gave a great impulse to the spread of unionism among the various trades, which organised themselves in unions. According to the Glasgow *Argus* towards the end of 1833, " scarcely a branch of trade exists in the West of Scotland that is not now in a state of union." Attempts were even made to organise all the trades of the United Kingdom in one vast association, and the organisation started by Robert Owen in 1834 was on a Socialist basis. These attempts proved abortive, and the activity of extremists like Owen tended to discredit the movement. It suffered a distinct set back in Scotland at least through the strike of the Glasgow spinners in 1837, which once more provoked the intervention of the authorities and led to the severe punishment of its leaders. The spinners had at intervals resorted to the violent tactics which had characterised their action before the repeal of the combination laws, and on this occasion they indulged in riotous excesses in protest against the resolution of the masters to reduce their wages. They attempted to set fire to mills and attacked workmen who agreed to work at the masters' rates. One man was shot with fatal effect. The crime was followed by the discovery and the arrest of the members of the Strike Committee and five of them were ultimately convicted on rather dubious evidence and sentenced to seven years' transportation.

For some years the movement for better conditions of labour took a political turn. The Reform Bill of 1832, which had done so much for the political emancipation of the middle class, had done nothing for that of the people in the larger sense. A dozen years before the passing of the Bill the workmen of Glasgow, Paisley, and the western district had not only combined and struck work for this purpose, but attempted in small bands to enforce the demand for universal suffrage. The result was a collision with the military at Bonnymuir, in which many of the

insurgents were wounded and a number taken prisoner, three of whom—among them Andrew Hardie, a forbear of J. Keir Hardie, —suffered the death penalty (August, 1820). The Reform Bill gave an impulse to the movement for the extension of the franchise to the people in order to enable them to remedy their grievances by legislative means. Popular reformers insisted with no little force that the improvement of the condition of the working class depended on the possession of political power and embodied their views in the People's Charter, which demanded manhood suffrage, vote by ballot, annual Parliaments, etc. These demands were far in advance of the time, and the resort to violence in support of them, in addition to their visionary character, deprived the movement of any practical effect. Though the Charter did not receive the official recognition of the Trade Unions, it aroused much enthusiasm among the people. A great demonstration in its support was held at Glasgow in May, 1838, and other Scottish towns testified in its favour, whilst refraining from the popular disturbances which it excited at Birmingham and other English centres. In December, 1839, a conference of Scottish Chartists, held at Edinburgh, emphatically expressed its preference for constitutional methods and denounced the resort to physical force. The Trade Unions also preferred the saner method of agitating on constitutional, not revolutionary, lines for the redress of their grievances. "Laying aside all projects of social revolution," remark Mr and Mrs Webb, "they set themselves resolutely to resist the worst of the legal and industrial oppressions from which they suffered, and slowly built up for this purpose organisations which have become integral parts of the structure of a modern industrial state. This success we attribute mainly to the spread of education among the rank and file, and the more practical counsels which began, after 1842, to influence the Trade Union world."

The growing sense of the importance of intelligent, informed action in the decision of industrial questions is apparent in the establishment of classes for mutual improvement and of trade journals for the diffusion of technical knowledge. Such a class was, for instance, started by the Glasgow Branch of the Scottish United Operative Masons in 1845. Whilst the organised strike

appears as the oft recurring expedient for securing the increase, or resisting the reduction of wages, or bringing about a diminution of the hours of labour—especially during years of trade depression—there is also discernible a tendency to make trial of conciliation and arbitration in industrial disputes. In the case of the lock-out of the Clyde shipwrights, for instance, who demanded an increase of wages in April, 1877, and agreed to submit to the arbitration of Lord Moncrieff, who decided in favour of the employers. As a rule, however, the employers showed little disposition to encourage this pacific policy. They usually met proposals of this kind by resolute resistance to any interference with the right to regulate the hours and terms of labour and make their own agreements with their employees. The expedient of the strike was, therefore, not always the fruit of the unreasonable discontent of the workers in times of depression. Nor had the employers always the best of the dispute. In 1871-72 the English engineering operatives of the north-eastern district struck for a nine hours' day, and after a long struggle compelled this concession. The workers in the Clyde shipbuilding yards went one better, and without a strike secured a 51 hours' working week, though the hours were again raised during the disastrous years 1878-79, when the failure of the City of Glasgow Bank intensified the prevailing depression and ruined all but half-a-dozen of the Scottish Unions.

The two men who from about the middle of the century did most to organise Scottish labour were Alexander Campbell and Alexander MacDonald. Campbell had been a disciple of Robert Owen and secretary of the Glasgow Carpenters' Union in the days of the Owenite agitation. He became editor of the *Glasgow Sentinel* and one of the leaders of the movement to give the local unions a corporate existence in the form of Trades Councils, which resulted in the formation of these Councils in the large industrial centres of the United Kingdom between 1858 and 1867. These were a sort of workmen's Parliaments for the discussion and advocacy of matters bearing on the industrial and social interests of the organised workers. Those of Glasgow and Edinburgh were among the first to be established. Campbell's friend and fellow organiser, Alexander MacDonald, who was born in

1821, began to work in a Lanarkshire pit at the age of 8. In 1846 he became a student at Glasgow University and maintained himself during the winter sessions by working as a miner in the summer. In 1850 he became a teacher and seven years later devoted himself wholly to agitation in the miners' interest. He unsuccessfully stood for Kilmarnock Burghs in 1868, but was elected for an English constituency in 1874. He was chosen president of the Miners' National Union, whose foundation in 1863 was largely due to his exertions, and retained this post till his death in 1881.

These Councils lent a powerful support to the policy of seeking to secure, by means of Parliamentary action, the social and industrial improvement of the working class, which the leaders of Trade Unions adopted from about 1860 onwards. Under Campbell's leadership the Glasgow Councils, along with those of other towns, took an active part in helping to carry the Reform Bill of 1867-68, which enfranchised the artisan in the towns. Glasgow was again in the forefront of the agitation for the reform of the Master and Servant Act, which favoured the master at the expense of the servant, breach of contract on the part of the latter being, under this Act, a crime punishable by imprisonment, whilst the former could only be sued for damages for the same offence. Moreover, the law allowed the master, but not the servant, to bear witness on his own behalf. Campbell and MacDonald brought the question before the Glasgow Council, and as the result of the combined action of those of Glasgow, Edinburgh, London, and the English provincial towns, seconded by the Trade Unions throughout the United Kingdom, the law was amended in 1867. This amendment constituted " the first positive success of the Trade Unions in the legislative field." They also co-operated effectively in the passing of the Act of 1871 entitling Trade Unions to register as legal associations and thus securing legal protection for their funds. The keen resentment over the failure to prevent the passing of another Act restricting strike action on their part intensified the determination to secure direct labour representation in the House of Commons. MacDonald had in 1868 become a candidate for the Kilmarnock Burghs, but had retired before the election. At the General

Election of 1874 he and Thomas Burt, another leading official of the Miners' National Union, were returned for Stafford and Morpeth respectively—the first two Labour members to enter Parliament. The result was the repeal of the Act restricting strike action and the substitution for the Master and Servant Act of the Employers and Workmen Act, which put employers and employees on an equal footing before the law and fully recognised the right of collective bargaining after fifty years of organised effort. There was ample reason in this legislation for the enthusiasm with which Mr G. Howell, at the Trade Union Congress at Glasgow in 1875, eulogised Mr Cross, the Conservative Home Secretary, who had been the sympathetic instrument of placing on the Statute Book " the greatest boon ever given to the sons of toil."

So far Trade Unionism had been confined to the skilled workman. Towards the end of the " eighties " a movement was begun by John Burns, Tom Mann, Keir Hardie, and others, to organise the unskilled workers. Connected with this movement was the recrudescence of Socialist theories, which aimed at eliminating capitalism and private profit from industry and nationalising production for the benefit of the workers and the community. The continuance of trade depression, the recurring unemployment, poverty, and misery of large sections of the working class as the result of alternating over-production and commercial stagnation, social evils like bad housing and sweating gave an impulse to the propaganda of the Social Democratic Federation. Trade Unionism had effected much for the industrial and political emancipation of the artisan class. But it had failed to assure it a steady and adequate livelihood, and the Socialist reformers sought the remedy in a complete transformation of the industrial system. To these reformers Unionism was at best but a partial remedy for the evils of this system. Whilst professing the new Socialist doctrine, men like Burns and Mann were content to agitate for reform on Unionist lines, such as an eight hours' day as a cure for unemployment, pending the transformation to be attained by the nationalisation of industry. By their energy and their enthusiasm they succeeded in infusing a more aggressive spirit into the Trade Union movement, which

gained a large accession of members as the result not only of the organisation of unskilled labour, but of the swelling of the ranks of the old Unions. A more doctrinaire section, led by Hyndman, was, however, not content to infuse a new spirit into the old methods. This section dreamed of an international social revolution by the concerted action of the workers on behalf of the new teaching. They contemplated nothing less than the overthrow of the dominant industrial system and Hyndman looked to the centenary year of the French Revolution in 1889 to inaugurate it. For such day dreams the mass of English and Scottish workers had no taste. Burns and Mann left the Social Democratic Federation, and though the Socialist propaganda continued to make progress in the next quarter of a century, the revolutionary method failed to secure the adhesion of responsible English and Scottish Socialist leaders, and formed no part of practical Trade Union politics.

The Unions preferred instead to concentrate their energy on the policy of extending Labour representation in Parliament and organising a Labour party to further the interests of the working class independently of the Liberal party, though they continued to co-operate with this party in supporting Liberal measures to this end. The first practical step in the organisation of an Independent Labour Party was made by a group of Scottish Socialists, including Keir Hardie, Cunninghame Graham, and Robert Smillie, shortly after Hardie's unsuccessful attempt to contest Mid-Lanark in the Labour interest in opposition to both Liberals and Conservatives in 1888. It adopted an extensive reform programme and issued a manifesto emphasising the necessity for the working class to organise itself in order to secure by its voting power the realisation of these reforms. The Scottish movement was extended to England, and resulted four years later in the formation of the Independent Labour Party at a meeting at Bradford in 1892. Besides Keir Hardie, two other Scotsmen, Ramsay MacDonald and Bruce Glasier, became prominent among its leaders. Its programme was Socialist, but it has co-operated with the Trade Unions, which form the Labour Party in the more general sense, in supporting legislation in the interest of the working class. Under the leadership of men like Hardie, Bruce

Glasier, Ramsay MacDonald, J. P. Clynes, Arthur Henderson, it has opposed reform by way of revolution. Trade Unionism has to a certain extent been penetrated by Socialist principles and tendencies, as in the case of the Miners' Federation, which now champions, for instance, the nationalisation of the mines. But in its advocacy of reforms such as the eight hours and later the six hours' day for miners, and shorter hours for all classes of workmen, the Workmen's Compensation Act, the Workmen's Insurance Act, Old Age Pensions, etc., it has remained steadfast to the policy of constitutional action, in spite of extremist clamour for direct action to secure political and social reform. The growth of the Labour Party in and outside Parliament has placed at its disposal the means of promoting such legislation without recourse to the revolutionary methods which, favoured by the great war, have produced such startling effects in some Continental countries.

The growth of the Trade Union movement during the last quarter of a century in the United Kingdom has been phenomenal. In 1892 the number of Trade Unionists in the United Kingdom was estimated at over $1\frac{1}{2}$ millions, of whom about 150,000 were credited to Scotland. Of the Scottish trades represented, by far the larger number belonged to the engineering and metal industries with over 45,000 members. The building trades came next with about 25,000, the miners next with over 21,000, the labourers and transport workers next with about the same total, by far the larger proportion being confined to the great industrial centre between the Clyde and the Forth. Twenty-five years later the membership of the various unions in the United Kingdom had swelled to between five and six millions, and the movement had spread to the remoter area previously untouched by it. It has, moreover, brought within its range classes of workers, such as teachers, chemists, clerks, farm servants, nurses, who had previously stood outside or been little affected by it. Another feature is the endeavour to obliterate the distinction between skilled and unskilled workers in the same industry and to organise all workmen in one industry in a single union. Some of the Scottish Unions, such as the miners and railwaymen, are amalgamated with those of England; but in a

large number of cases they have a separate national organisation and have not even agreements with kindred English Societies.

In spite of much criticism and opposition, the movement has been of great service to the workers. It was the inevitable outcome of the evils incident to the accentuated individualist commercial and industrial system of the nineteenth century. During a large part of this century the working class in Scotland suffered from periodic trade depression, and the consequent fall in wages and unemployment. In the intervals of trade revival employment and wages, indeed, improved, and destitution was correspondingly reduced. But it was always there, more or less, and terrible enough, in the annals of the century, was the misery accruing from it, in spite of the all too meagre attempts at relief by way of charity or the artificial provision of employment. Fluctuations of trade, over which employers had no control, doubtless operated in producing this state of things. But it can hardly be doubted that the industrial and commercial system was itself largely responsible. This system proceeded too much on the policy of increasing profits as much as possible as the first essential of business, without an adequate and general realisation of the obligation to care for the interest of the workers equally with those of the employer or the shareholders. Otherwise the conditions of labour in factories, workshops, and mines would not have been suffered to remain so long so deplorably lacking as was the case till far into the century. What can only be described as sweated labour was far too general in many industries, in which large incomes and dividends were made at the expense of the well-being of the workers.

10. Education

The condition of Scottish education at the beginning of the nineteenth century was far from satisfactory in two respects. The parish schoolmasters were as a rule poorly paid, and the number of schools was far from adequate. The economic progress of the country, which had raised prices and wages, had not

raised the schoolmasters' salaries, and the growth of population, and, especially in the Highlands, the size of the parishes had increased the deficiency of school accommodation. In the Highlands, indeed, the lack of schools was still deplorable in spite of the efforts of the Society for the Propagation of Christian Knowledge to remedy the defect. Dr Shaw, writing in 1775, avers, for instance, that from Speymouth to Lorn there was only one school—that at Ruthven in Badenoch—and that it was unusual to find in a parish three persons that could read and write. In vain the Church had appealed in 1782 to the Government for help. The opposition of the landowners would not be overborne by the forcible arguments on the poor schoolmasters' behalf. "Ninety years (counting from 1698, the date of the Educational Act of the Scottish Parliament) have produced such a change and so great improvements in the agriculture, navigation, commerce, arts, and riches of this country that £15 sterling per annum at the end of last century may be considered as a better income than £45 sterling per annum at this present time. Suppose then that in Scotland there are 900 parochial schoolmasters, which is very near the truth, 800 of them will be found struggling with indigence, inferior in point of income to 800 day labourers in the best cultivated parts of this island, and receiving hardly half the emoluments of the menial servants of country gentlemen and wealthy citizens." The Act of 1803 was an all too belated attempt to remedy these evils. It raised the schoolmaster's salary to a maximum of 400 merks and a minimum of 300 (100 merks=£5, 11s. 1½d.) and provided for a revision every twenty-five years. It compelled the heritors to provide a dwelling house, consisting of not more than two apartments, including the kitchen, and a garden, or its equivalent in money—an extravagance which the lairds denounced as erecting "palaces for the dominies." It further required the heritors, in the case of parishes of large extent and population, to erect a second school (or side school, as it was called), furnish a sum of 600 merks, and divide it among the teachers. The act certainly did not err on the side of generosity, and was only a makeshift. A Government investigation in 1818 brought out the fact that 50,000 children of school age were still without instruction from lack of

accommodation, while in the Highlands, where the lack was most felt, half the population were unable to read. The General Assembly took up the problem through its Education Committee, which it established in 1824, and which raised subscriptions for the establishment of schools chiefly in the Highlands and Islands ("Assembly Schools.") In 1836 it appealed to the Government to provide schools in connection with the 42 Government churches in the Highlands (*quoad sacra* parishes), and two years later an Act was passed to carry the proposal into effect ("Parliamentary Schools.") In 1839 it started a scheme to provide schools in all the *quoad sacra* parishes of the country, in addition to the schools of the parishes from which these were detached ("Sessional Schools.") To this end it availed itself of the Grants in Aid sanctioned in the same year.

The Disruption in 1843 led to a great increase in school accommodation, the Free Church building its own schools as well as churches for the education of children belonging to its communion. It led, in fact, in many places, to the overlapping of schools which owed their existence to ecclesiastical rivalry rather than to real educational need. Within five years the Education Committee of the Free Church had raised nearly £40,000 for this object, and it spent this sum in establishing Normal Schools in Edinburgh and Glasgow for the training of its teachers, and a large number of schools throughout the country. In 1850 the number of these schools was 626. In addition to these there were other denominational schools belonging to the smaller religious bodies, besides those maintained by the Church of Scotland and the Society for Propagating Christian Knowledge, and a large number of private schools.

The national or parochial system had thus, by the middle of the century, been materially supplemented by ecclesiastical or private effort. The denominational element in education accentuated the growing feeling against the exclusive control by the Church of Scotland over the parish schools and in favour of a national system under the control of the State. The next important Education Act—that of 1861—not only substantially improved teachers' salaries, making the minimum £35 and the maximum £70, but provided larger dwelling houses. It relaxed

the obligation to sign the Confession of Faith and the Formula of the Church of Scotland, and substituted a declaration not to teach anything subversive of the Bible and the Shorter Catechism. It thus opened the parish schools to at least all Presbyterians, irrespective of denomination. It transferred to the Scottish Universities the duty of examining the qualifications of teachers, whilst vesting in the minister and heritors of each parish the power of dismissing the parish teacher in case of neglect or inefficiency and in the Sheriff of the county in case of immorality or cruelty. The State further sought to control education through the Committee of Council, established in 1839 and subsequently known as the Scotch Education Department, by means of Government inspection and grants in aid, and the issue of certificates to properly qualified teachers. In 1850 there was only one Government inspector; in 1860 the number had grown to eight. The partial application to Scotland of the English Revised Code of 1861, with its principle of payment by results, was another step in the direction of State control.

Despite these successive improvements, education in Scotland left much to be desired. The Commission of 1867 reported that of about 500,000 children rather more than 90,000 attended no school, and that of about 400,000 who did only about half were in schools subject to inspection. The conviction had been steadily growing that a thorough organisation of national education, on the basis of State aid and control, was the only remedy, and this remedy was forthcoming in the Education Act of 1872. It set up a School Board in every parish and burgh for the management of the school or schools within them, and made the school independent of Church control. These Boards were elected for three years by the ratepayers who were owners or occupiers of an annual minimum value of £4, and each elector possessed a cumulative vote which he could record in favour of one or more candidates if so disposed. They were empowered to make an assessment through the Parochial Board for the maintenance of education, and to enforce the attendance at the " public " schools of all children between the ages of 5 and 13, though partial exemption was allowed in certain cases. They were required to supply adequate school accommodation

out of the local rates, and entitled to grants of public money through the Scotch Education Department. They were responsible for the management of the schools to this Department, whose approval of the time table was requisite, and these schools were subject to inspection by the Department's inspectors. Only on the fulfilment of these conditions were they entitled to share in the Parliamentary grant, and the amount of the grant depended further on the examinations conducted by these inspectors on the questionable principle of payment by results. They were, however, free to adopt or not religious instruction, and to decide on the nature of this instruction, subject to a conscience clause. Moreover, the Department had no power to compel them to use the compulsory powers as to attendance invested in them, for whose exercise they were responsible only to the electors.

The Act of 1872 was modified in important respects by subsequent legislation. In 1878 the employment of children under 10 years of age was absolutely forbidden, and no child between 10 and 14 was to be employed, even for half time, who had not passed a certain standard, subsequently fixed by the Department as the third standard, while for full time employment the standard was the fifth. Another Act, that of 1883, strengthened the compulsory powers of the Boards in dealing with parents who neglected to send their children to school. Hitherto it had been necessary for the Board to prove " gross " neglect, and refractory parents might evade conviction in the Courts by a merely nominal attendance of their children. Such evasion was now rendered impossible by the provision requiring attendance at school on every occasion when the school was open, the penalty for neglect being 20s., or imprisonment. In 1890 the system of individual examination and payment by results based thereon, on which the amount of the Government grant depended, was abandoned in favour of a general report on the work of the pupils and the average attendance. The abandonment of payment by individual results was undoubtedly a step in the right direction. The system was unfair to both teacher and pupil, and was bad educationally. It made the grant dependent on the hazard of a single annual examination by an official inspector, and took no

account of the strain on the pupil, who might not be at his best on such an awesome occasion. It tempted the teacher to drill his pupils for the examination rather than to educate them, to concentrate on the dullards rather than on the more gifted children. It ignored the record of the general work of the year, the real test of ability and diligence, and mistook mere proficiency in passing a test of what was liable to be crammed knowledge, for education.

The logical consequence of compulsion is free education, and the change was completed in 1893, when the payment of fees was abandoned in the case of all children between 3 and 15.

In 1890 the Boards were made responsible for the education of blind and deaf-mute children, and were empowered to pay, in cases where the parent was unable to do so, for the education and maintenance of these defective children in institutions such as the Royal Blind Schools and the Deaf and Dumb Schools at Edinburgh and Glasgow, which had been established for this special purpose. By two subsequent Acts (1906 and 1908) the Boards were themselves empowered to make provision for the education of these children between the ages of 5 and 16, and if such special provision was made, they were enabled to prosecute parents who neglected to take advantage of it. Besides these defective children, provision was made for dealing with neglected children by the Day Industrial Schools Act of 1893, which enabled them to establish such schools and to contribute to those established by private philanthropy.

The scope of the Act of 1872 was not limited to elementary education, as was that of 1870 in England. It was meant to provide education " for the whole people of Scotland," and not merely for the children of the working classes. It contemplated the continuation of the higher instruction given in many of the parish schools which had prepared pupils for the Universities, and it was applicable to the Burgh or Secondary Schools, which were managed by Town Councils and were now placed under the jurisdiction of the School Boards. The class of higher schools which remained outside their jurisdiction, though some were subsequently absorbed, were academies and institutions established by subscription or endowment, and managed by their own gover-

nors. The large number of schools originated and carried on by private adventure, and the denominational schools maintained by the Episcopal and Roman Catholic Churches, were also independent of their control.

The secondary schools, though managed by the Boards, did not at first share in the Parliamentary grants to any appreciable extent. They were maintained, as before, by endowments or contributions and by the pupils' fees, which, under the *régime* of the Boards, were no longer paid to the individual master, but were collected into a common fee fund and divided among the teachers according as the Board might determine. Secondary education in Edinburgh greatly benefitted by the reforms of the Merchant Company, which abolished endowed Hospitals in 1869 and (with the exception of Gillespie's Hospital, which became a primary school and later a higher grade school) transformed them into secondary and fee paying educational institutions with thousands, instead of hundreds, of pupils. A similar reform was effected in the case of George Heriot's Hospital in 1885; Allan Glen's School, Glasgow, in 1876; Robert Gordon's Hospital, Aberdeen, in 1881. Improvements in the same direction were effected in many endowed institutions in other places. The Scottish Education Department, under the auspices of Sir Henry Craik, energetically took up the question of higher education, and inaugurated, in 1886, the inspection of secondary schools. It was not, however, till 1892, that State aid, in addition to State control, was materially extended to these higher public schools in the form of a sum of £60,000 placed at the disposal of the Department for this purpose. The distribution of this grant was, however, entrusted, not to the Boards, but to Secondary Education Committees for the counties and the larger burghs, these committees being under obligation to furnish the Department with satisfactory evidence as to the adequacy of the accommodation and the teaching staff and the efficiency of the teaching, as a condition of sharing in its benefit. Six years later (1898) an additional sum of considerable amount became available for this purpose, partly on the ground that further provision was necessary in view of the advance of the teaching of science and the heavy expense of providing specially qualified teachers and

apparatus. In 1906 the amount at the disposal of the Secondary Education Committees was substantially increased from the General Aid Grant. Grants had also been made since 1859 by the Science and Art Department in aid of science teaching in schools which specialised in this branch, and in 1897 these science and art grants were transferred to the Scottish Education Department, which devoted them to the development of the science side of the instruction given in secondary schools, properly equipped for the purpose, as well as in schools in which the instruction was more specifically modern and scientific, such as George Heriot's, Edinburgh; Allan Glen's, Glasgow; and Gordon's College, Aberdeen. Encouragement was also given in 1890 to technical education by placing at the disposal of local authorities a sum, which ten years later had risen to £15,000 (the Residue Grant) and which was applied to this object through the Secondary Education Committees.

In addition to these grants, a great impulse was given to secondary education by the introduction, after several tentative steps in this direction, of the Leaving Certificate Examination in 1888. By this scheme the Department furnished a means of testing the instruction given in these schools and awarded a certificate to the successful pupils. At the same time the scheme tended to foster a more uniform system of secondary education, which had hitherto been conducted in too haphazard a fashion. At first, however, the examination was confined to higher class schools, and it was not till four years later (1892) that it was extended to the Board Schools in which higher instruction was given. The establishment of the entrance examination to the Universities by the Universities Commission in the same year gave an additional impetus to secondary education. Still another was afforded by the policy of the Department, adopted in 1889 and subsequently developed, of affording an avenue, through the establishment of the Higher Grade School for further study, to pupils of elementary schools over 14, who had reached a certain standard of proficiency, and the more capable of whom were ultimately enabled, by means of this higher course, to enter the University. As a test of the instruction in the higher grade and other schools which were unable to retain these pupils up to

the stage of the Leaving Certificate Examination, the Intermediate Certificate was subsequently instituted. Both these certificates were designed to test the proficiency of the candidate, not in any one subject or number of subjects combined at haphazard, but in groups of subjects in accordance with a definite course of school instruction or curriculum. The examination thus became a test not merely of the knowledge, but of the real education of the pupil, and to this end the school work of the candidates, as adjudicated by the teachers, from 1906 was to be taken into account in judging their merits.

As the result of the Act of 1872 and the legislation in supplement of it, elementary education in Scotland had made remarkable progress during the thirty years between the passing of the Act and the beginning of the twentieth century. Under the Boards, school accommodation had greatly increased all over the country and the character of the accommodation had greatly improved. One has only to think of the large and handsome buildings erected during the period, not merely in the large towns, but in every considerable centre of population. The school attendance showed a corresponding rise, and the staffing of the schools had become more adequate and efficient. Salaries had risen, though the average still left much to be desired. In the 23 years from 1873 to 1896 the schools under inspection rose from 2,000 to over 3,000, the number of school places from 300,000 to 789,000, the number of pupils on the rolls of inspected schools from 280,000 to 708,000, and the average attendance from 220,000 to 587,000. Besides the day schools, a system of continuation classes had come into existence, in which instruction in specific as well as school subjects was provided. In 1897-98 over 95,000 pupils were enrolled, though the average attendance was little more than half the number. Included in the specialised courses given in these classes was, besides literary and commercial subjects, instruction in the various crafts and arts, such as engineering, naval architecture, navigation, textile and chemical industries, women's industries, agriculture, etc.

The Act of 1872 was further supplemented in the first decade of the twentieth century by the Acts of 1901 and 1908, and by special minutes of the Department. The former raised the school

age from 13 to 14 years, and that at which children might be employed from 10 to 12, whilst allowing School Boards to grant exemption from attendance for employed children between 12 and 14 on certain conditions. The latter was far more thoroughgoing. It included the physical welfare of the children. It empowered Boards to provide accommodation and apparatus and service for the supply of meals to the children attending schools, though not to pay for these meals out of the school funds, to undertake their medical examination, to call the parents of filthy, or verminous, or ill-clad and underfed children to account, and, in case of insufficient or unsatisfactory explanation, to institute proceedings against them for such neglect, unless unable by reason of poverty or ill-health to provide a remedy. In this case provision must be made out of the school fund, failing aid by voluntary agency. Children between 14 and 16 were required to attend further instruction in day or evening continuation classes, and the Boards were required to provide such instruction in continuation classes with reference to the crafts and industries practised in the district (including agriculture and the domestic arts), in the English language and literature, and in Gaelic speaking districts the Gaelic language and literature, and also in the laws of health and physical training. They might, moreover, make bye-laws requiring attendance at such classes up to the age of 17, provided that the classes were not held beyond two miles from the residence of the pupil. The restriction of the power of School Boards to grant retiring allowances to teachers in the Act of 1898 was repealed, and provision was made for such retiring allowances out of a superannuation fund partly established by the State, partly by the teacher, and partly by the School Board, the allowance to be in proportion to salary and service. The teacher was also granted the right of appeal to the Department against dismissal by the Board, and his tenure of office was thereby safeguarded against arbitrary local action. Provision was likewise made in the form of grants (including bursaries and travelling expenses of pupils) for higher education in intermediate and secondary schools, training colleges, central institutions, and Universities.

The Act of 1908 was not thoroughgoing enough for the more

advanced educational reformers, who desired to enlarge the area of the local school authority from the parish to the county, to abolish cumulative voting, to correlate the various classes of schools in a properly organised general system of education, etc. For ten years they continued to agitate in favour of these reforms, the Educational Institute of Scotland taking a leading part in the movement, and the result of their efforts was the Act of 1918, which may be described as marking in some respects an educational revolution. In place of the 947 School Boards, the Act substituted 38 local educational authorities, elected on the principle of proportional representation, and consisting of five of the largest burghs and thirty-three counties. It established committees for the management of schools or groups of schools within each area, consisting of members of the education authority, parents of the children, and at least one teacher of the schools concerned. To the education authority of the area was, however, reserved the raising of money by rate or loan, and the general control of expenditure, the acquisition or holding of land, the appointment, transfer, remuneration, and dismissal of teachers, and the recognition or establishment of intermediate, secondary, and technical schools within the area. Power was given them to make grants to capable pupils to enable them to attend secondary schools, universities, training colleges, central institutions, and continuation classes, and to provide books for general reading not only to pupils, but to the adult population of the area. They were required to submit to the Department, henceforth to be known as the Scottish (not Scotch) Education Department, a scheme for the adequate provision of free primary, intermediate, and secondary education (including the teaching of Gaelic in Gaelic-speaking districts), and were empowered to maintain a limited number of fee-paying schools if deemed desirable, and to establish day nursery schools for children between 2 and 5. They were further required to submit a scheme of salaries which must not fall below a minimum national scale, which superseded what was known as the Craik scale of 1917, and which involved a substantial rise in the remuneration, and therefore gave promise of a corresponding rise in the status of the teacher. Liberty was conceded to continue the custom of giving

religious instruction, subject to a conscience clause. The compulsory school age was raised to 15, and in the case of blind and deaf-mute children to 18, the age for exemption to 13, that for attendance on continuation classes to 18, the attendance to be given between 8 in the morning and 7 in the evening, and medical inspection was made applicable to the pupils in attendance. Voluntary or denominational schools might be transferred to the Education Authority on terms to be arranged between the parties, and the authorities were bound to accept such transfer on agreement as to the terms being attained. These schools thus obtained recognition as public schools and a share in education grants through the authority, which has the right of regulating their curriculum and appointing their teachers who, however, must have the approval of the Church or denomination to which they belong, and are empowered to give the specific religious instruction hitherto usual, under the supervision of a supervisor appointed by the authority. Another new feature was the Advisory Council for the purpose of advising the Department on educational matters, and consisting, to the extent of two-thirds, of persons qualified to represent the views of bodies interested in education. Local Advisory Councils to advise the Education Authority were also made available for each area.

The Act is the monumental completion of the long series dealing with education in Scotland, and is fraught with great possibilities for the social and industrial welfare of the Scottish people. "It transfers," to quote its editor, Professor Strong, "the administration of education to the county, and introduces a new system of voting in elections; it increases the powers and duties of the new education authorities; it makes possible a close approximation to two ideals of democracy—an educated community and equal opportunity for all—by providing increased facilities for the full educational development of the child and the adolescent; it sets reasonable bounds to the employment of young people in industrial and commercial work; it promotes the education and self-improvement of the adult; it goes far towards solving the voluntary or denominational school problem; and it deals with the vexed question of teachers' salaries in a simple and satisfactory manner. . . . It is a serious effort to

bring Scotland, in regard to educational facilities, in line with current ideals in education. It recognises the fact that civilisation is progressive, and that no country, however distinguished in the past, if it intends to keep in line with modern development, can afford to rely merely on tradition." It is, however, proving very expensive to work, and in the poorer and sparsely populated areas the question of providing the huge additional expense out of the rates is one of grave difficulty.

The training of teachers is a supremely important part of any national system of education. Up to 1905 this training was almost entirely in the hands of the Churches. Six training or Normal Colleges had been established by the Church of Scotland and the Free Church—two by each at Edinburgh, Glasgow, and Aberdeen. One belonged to the Episcopal Church, and in 1895 a training college for Roman Catholics was established at Dowanhill, Glasgow. St. George's College, Edinburgh, founded in 1886, concerned itself with the training of secondary teachers. In the Church Colleges the students consisted mainly of those who had served a five years' apprenticeship as pupil teachers in the Board Schools, and the standard of their preliminary and Normal education underwent a gradual advance from 1873 onwards. Many of the most meritorious of the elementary teachers were trained under this system, and a growing proportion of these managed to combine a University with their Normal course. In 1895 a new class of teacher students came into existence. These were known as Queen's, subsequently King's, students, who received an allowance from the Department to attend the University whilst undergoing their practical training under the supervision of local committees at the University seats. It was not till 1905, however, that the Department (minute of 30th January) directly undertook the training of teachers by taking over the Colleges of the Church of Scotland and the United Free Church, and transferring their management to committees known as Provincial Committees, representing the education authorities of the four University districts, with co-opted members from the churches. To these committees was entrusted the training of primary and secondary teachers and teachers of special subjects. This training was to be taken in two stages—the pupil

teacher or Junior Student, and the Senior Student or Training College stages. To enter on the first stage the Junior Student must have obtained the Intermediate Certificate, and thereafter undergo a course of three years' advanced instruction in the usual school subjects. During this course he must receive systematic training in the art of teaching, and at the end of it pass the Leaving Certificate examination. Having obtained, in addition, the Junior Student Certificate, the student then enters the Training College as a Senior Student to prosecute a further course of education and professional training extending over two years, attendance at University classes or those of a central institution, such as an agricultural or technical college, being permissible. Those in training as secondary teachers must, as a rule, have graduated and show a special knowledge of the subject which they desire to teach (graduation with honours in a specific subject), and must undergo a year's professional training in the Training College. For teachers of special subjects, such as Domestic Economy, Drawing, Educational Handwork, the preliminary education was not so high, not exceeding, as a rule, the Intermediate Certificate standard. They must, in addition, possess the diploma of a recognised institution in the subject to be taught, and must undergo a course of professional training with particular reference to the special subject professed.

During the last fifteen years the curriculum for the various classes of senior students has been considerably modified by the Provincial Committees, in co-operation with the Department, in the direction of combining University study with professional training, whether with a view to graduation or not, and extending the duration of the course to three or four years accordingly, while retaining the two years' course for those who are unfitted to attend University classes. There is also a strongly marked tendency to raise the standard of preliminary education, and to require of entrants a preliminary standard equal to that for the other professions.

During the last fifty years, and especially since the opening of the twentieth century, a marked development of University education has taken place. A number of Acts were passed, and successive commissions appointed under them, to investigate and

reform University teaching and administration throughout the nineteenth century. The Act of 1858 invested the supreme control of financial administration in a body called the University Court in each of the four Universities, and empowered it to review the decisions of the Senatus. It instituted a General Council, consisting of all graduates, with the right of electing the Chancellor who presides over it and, subsequent to 1868, a joint member of Parliament for Edinburgh and St Andrews, and Glasgow and Aberdeen respectively, and of making representations to the Court on University affairs. It appointed a Commission to carry out these and other reforms, and this Commission regulated the curriculum for degrees in Arts, Law, and Medicine. It fixed the number of subjects for the M.A. degree at 7—Classics, English, Mathematics, Natural Philosophy, and Mental and Moral Philosophy, and the attainment of this degree was conditional on a pass in all these subjects. It did not, however, venture to propose the institution of a preliminary examination for all students as a condition of their entrance on University study in the Arts Faculty. The course of study for the ordinary degree was four years, but exemption from the junior classes of Latin, Greek, and Mathematics was allowed to students possessing a competent preliminary knowledge of these subjects, and such students might complete their graduating course in three years. It established an Honours degree in groups of these subjects and in the department of Natural Science. For graduation in Medicine the course also extended to four years, to be completed by the degree of Bachelor of Medicine and, in the case of surgeons, Master of Surgery, in place of that of Doctor of Medicine, which was now only attainable, in the cases of Edinburgh, St Andrews, and Aberdeen, after the expiry of two years from the date of the first degree. In the Faculty of Law it instituted the degree of Bachelor of Laws, which could only be taken by those who held the Arts degree, but declined to entertain the proposal for a Bachelors degree in the Faculty of Divinity. It made provision for the co-operation of outside examiners with the professors in the degree examinations and for the appointment of assistants to professors, and recommended the establishment of a number of new chairs.

This reform served its purpose for the time being by improving the administration of the Universities, organising the curriculum for degrees, and giving an impulse to graduation in Arts, which had been little taken advantage of, as the result of efficient work up to a certain standard. It led to the founding of several new chairs, notably at Edinburgh, where, up to 1876, chairs in Engineering, Geology, Political Economy, and Education had been established, and to the union of King's College and Marischal College at Aberdeen into one flourishing University. Splendid new buildings for Glasgow University were begun at Gilmorehill in 1869, and ultimately completed at a cost of nearly half a million. But the Commission left some defects for the future to remedy. The retention of the junior classes in some of the Arts subjects tended to keep down the standard of University education, and burden the professors with work which properly pertained to the secondary school. Secondary education in the schools was, however, too inadequate, and the argument on this ground for their continuance was too forcible to be overborne. The same argument told against the institution of a preliminary examination which is essential to the profitable pursuit of University studies. Another weakness was the lack of facilities and stimulus for higher research work, the advancement of knowledge, which it is an important function of a University to further. Moreover, the restriction of the degree curriculum in Arts to certain subjects militated against the study of important modern subjects like Political Economy, in which graduation was impossible. Greater liberty and elasticity were desirable in the interest of higher modern education, however valuable in itself the training afforded by the favoured seven subjects.

These defects were remedied by the Commission of 1889 and the following years. It instituted a preliminary examination in 1892, conducted by a Joint Board of Examiners for the four Universities, from which the candidate might be exempted if he had passed the Leaving Certificate of the Scottish Education Department. It accorded liberty of choice in the selection of subjects, including Science, to be studied for the ordinary degree, whilst retaining seven as the number to be professed, and including in the number certain of the older graduation subjects,

which must be taken in any one combination. Thus History, Political Economy, Modern Languages, Education, etc., obtained a place as ordinary qualifying degree subjects, which had hitherto been denied them. Special study was encouraged by the grouping of a wide range of subjects in which the Honours Degree could be taken, and reducing the number of subjects in which the Honours student must, in addition, pass on the ordinary standard. Boards of Studies were instituted to advise the Faculties of Arts and Science as to the instruction given in the four departments into which the subjects qualifying for the Arts degree were divided—one Board in each department. Another step in advance was the institution of a Faculty of Science, with the degrees of Bachelor and Doctor in Pure and Applied Science, and a preliminary examination of the same standard as for those entering on the Arts course, with the option of Modern Languages for Latin or Greek, and a higher standard in Mathematics. Doctorates were also instituted in Philosophy and Literature, which were attainable by those who had taken an Honours degree in the relative subjects, and after a stated interval of further study produced a thesis adjudged to be an original contribution. To encourage this higher study, the Senatus was empowered to appoint Research Students and Fellows, and the Court to provide stipends for the latter. The Commission also opened the University to women students by admitting women to every degree on the same terms as men, though the Edinburgh Medical Faculty for about twenty years longer declined to admit them to its classes, and they were under the necessity of obtaining instruction in extra-mural institutions. In Glasgow the foundation of Queen Margaret's College for Women, through the generosity of Mrs Elder in 1883, which was incorporated some years later into the University, provided a separate establishment for their education, including the study of Medicine. In the Medical Faculty the Commission instituted a preliminary examination, extended the course from four to five years, introduced four professional examinations during this course in the various departments of Medicine, Surgery, and Midwifery, made it obligatory on the candidate to obtain the Bachelorship of Medicine and Surgery, and made that of Master

of Surgery a higher degree equivalent to the Doctorate of Medicine. It made some changes relative to graduation in Law and Divinity, and instituted a Faculty of Music in the University of Edinburgh, and the Degrees of Bachelor and Doctor of Music. It greatly increased the teaching power of the Universities by empowering the University Courts to appoint Lecturers in subjects not already included in the instruction given in the various Faculties, and established new chairs in some of these subjects, such as Chairs of History at Edinburgh and Glasgow, English Literature at St Andrews and Aberdeen, Political Economy and Pathology at Glasgow, Public Health at Edinburgh, and several medical chairs at St Andrews. It consummated the union of St Andrews and University College, Dundee, between which there had been prolonged friction over the question of affiliation, and made provision for the maintenance of University laboratories, libraries, and museums. In addition, large buildings have been erected to meet the needs of the medical and scientific departments, and Edinburgh has contributed the most recent and striking evidence of this kind of advance by the purchase of 100 acres in the southern suburbs for the erection of a grand suite of departmental laboratories. It enlarged the membership and administrative powers of the University Courts, whilst recognising the responsibility of the Senatus for the purely educational side of University work, and instituted a Students' Representative Council in each University, with power to petition the Court and Senatus in matters affecting their interests.

The Report of their long and arduous labours, presented to Her Majesty in 1900, marks the beginning of a new epoch in Scottish academic history. The development of University education during the intervening twenty years since its publication can only be described as phenomenal. A large number of additional ordinances promoted by the University Courts have helped to bring their enactments to fruition, whilst modifying them in important respects for the fuller realisation of this purpose. The munificent liberality of Mr Carnegie in placing, in 1901, at the disposal of the Universities a large fund, administered by the Carnegie Trust, has greatly facilitated this develop-

ment. Additional professorships have been established in a variety of subjects. Lectureships in great number have reinforced the professorial teaching. The study of Science and Medicine, in particular, has been rendered more comprehensive and efficient by the provision of laboratories and apparatus, and increasing attention has been given to the bearing of University instruction on industrial and commercial requirements. A degree in commerce has been instituted, preparatory to the establishment of a Faculty of Commerce. Technical Colleges have been affiliated to the Universities at Edinburgh, Glasgow, and Aberdeen, and the influence of the Universities on secondary education has made itself felt through the Provincial Committees and the Joint Board of Examiners. The social life of the students has been fostered by the Students' Unions or Clubs, under the management of committees, composed largely of the students themselves, at each of the University seats, and by the movement to provide Hostels, in which they can obtain the advantages of a common life. It may be said that since 1889 the Universities have experienced, in both the intellectual and the social spheres, a renaissance which is at the same time a revolution.

During the period of educational history under review there has been a quickened sense of the importance of education in the national life. This conviction has become a truism among all enlightened people, whether specialists or not. Education is almost universally, if all too tardily, recognised as one of the greatest factors in the making or marring of both the individual and the nation. The more elementary stage is, in some respects, more important, from this point of view, than the more advanced, highly important as this, in its own place, is. It is at this earlier stage that mind and heart are so susceptible to the influences brought to bear on them—the stage when the making of the man or the woman is being accomplished in the boy or the girl. It is not merely a case of shaping the personal life; it is also a case of the making of the citizen, the member of the community and the State. Hence the importance of education from the political and the social point of view. We live in a democratic age—an age in which the democratic system of govern-

ment and the democratic spirit have swept with an irresistible flood over the world—and under these conditions education becomes a prime requisite. When a people was governed by an absolute ruler, or by an aristocracy, it counted for little or nothing in legislation, or administration, or policy, and its education was of less importance, though in the long run it invariably proved a blunder and a crime to neglect it. Under a democratic system, where the people is practically sovereign in all departments of the national life, education becomes an absolutely essential condition of national well-being. The development of modern history has been moving steadily in the direction of government by the people for the people in the larger sense of the whole body of the nation—the people in the national, not in the class sense. This is, among the more mature peoples at least, the inevitable, the only possible form of government. But on one indispensable condition—that the people in the mass have the benefit of a sound education in order to fit it to discharge its responsible functions with knowledge, judgment, and uprightness. From this point of view the vocation of the teacher is one of the highest worth, dignity, and utility. His influence is incalculable in the forming of the future citizen. What the national life shall be under such a system depends, in no inconsiderable degree, on his work in imparting sound knowledge, in cultivating the higher qualities of soul and character, in inculcating the ideals in which the true greatness, the real power of a people consist.

Equally important is the part to be played by education in the more strictly social sphere. Human society, apart from its political aspect, stands in need of the directing and elevating influence of education. In our own land, in particular, there is ample need for the training of the public conscience in higher things. There are blots like drunkenness and other social vices to be wiped out. There is the all too prevalent low taste in literature, art, music, to be elevated to a higher level of understanding and appreciation in things of the spirit. There is, too, the fear of God, which is the beginning of wisdom, to be nurtured in young hearts. In these and other respects the teacher can co-operate effectively with the social reformer, may indeed

become the greatest of social reformers. He may have to struggle with the adverse influences of what Dr Morgan in his admirable work, *Education and Social Progress*, calls defective heredity and defective environment. The inherited vicious tendency is there to mar his work. There, too, are the adverse influences of parental neglect, the squalid and overcrowded home, the low tone of a certain section of the Press, the almost epidemic rage for trashy and sensational forms of popular amusement. Even so, the concerted effort of the great army of teachers can, under the more favourable conditions which an enlightened public opinion will more and more contribute, effect much in counteracting the baneful influence of these demoralisers of our social life.

11. Culture

Besides the direct influence of education on Scottish intellectual life, literature and the Press played in the nineteenth century their distinctive part in moulding that larger domain of the spirit which we may term the culture of a people. In literature there is apparent a widening of the horizon. There is still Scottish literature, and in Scott it produces a master in, say, *The Heart of Midlothian*, or *Waverley*, or *Rob Roy*, and the Scottish language, or, must we say, dialect, is made the vehicle of masterly delineations of national character and history. But Scott roams in wider scenes than the land of his sires, and in *Ivanhoe*, *Kenilworth*, *Quentin Durward*, depicts the life and manners of a larger world. Thomas Carlyle, the other great literary genius, who wielded such an influence on the thought of his countrymen, is frankly cosmopolitan in the subjects he treats. Stevenson, sufficiently notable as a writer to merit mention after these elect of literature, is also a cosmopolitan. These writers carry over the expanding outlook of the eighteenth century into the nineteenth, and in them Scottish literature sheds its national shell and merges in the great stream of English literature. Scottish literature, strictly so called, survives, but only in minor writers, who continue to represent national life and character in the

homely language of the people, though there is no reason why another great genius should not arise to depict these (in prose or poetry) in what is still the language of common life among the masses. Culture, as reflected in literature, becomes "liberal," not only in the sense of the study of the classics, which Scotland inherited from the Renaissance, but in the increasing interest in the thought and life of the modern world.

Literature in the more ephemeral form of the periodical and daily press underwent a great development throughout the century. In this department also we note the presence of a wider outlook, a larger life. In *The Edinburgh Review*, in its rival *Blackwood's Magazine*, and *The Quarterly Review*, which, though published in London, was inspired from Edinburgh, the Scottish capital held for long the leadership in the United Kingdom in literary criticism and political discussion, whilst the leading Scottish journals in Edinburgh, Glasgow, Dundee, and Aberdeen vied with those of London and some of the English provincial towns as exponents of current opinion.

Scott's childhood was troubled by ill-health, which necessitated frequent removals from Edinburgh, where he was born in 1771, to the Border region. It interfered with his studies at the High School and the University, but contributed to the self-education which consisted in wide reading and a widening knowledge of men, and which he continued after his school and college days. He adopted his father's profession of the law, and passed from his father's office to the Bar, to which he was called in 1792. He preferred literature to the practice of the law, and he was fortunate in obtaining a couple of appointments, first, in 1798, as Sheriff Depute of Selkirkshire, and some years later as principal clerk of Session, which yielded him a substantial income and gave him leisure for literary pursuits.

His first important compositions were poetic—*The Lay of the Last Minstrel*, *Marmion*, *The Lady of the Lake*, *Rokeby*, in addition to the ballad collection, *The Minstrelsy of the Scottish Border*. He is the master story-teller, in verse as well as prose, and these romantic epics took an astonished world by storm, though by the time that *Rokeby* appeared (1812) Byron was

emerging as a formidable rival for the popular favour, and the enthusiasm was less effusive.

Two years after *Rokeby*, *Waverley*, the first of the long series of novels, appeared (1814). In this precursor of the series, as in those that followed—*Guy Mannering*, *Old Mortality*, *Rob Roy*, *The Heart of Midlothian*, *The Bride of Lammermoor*, *A Legend of Montrose*—to mention only some of those referring to Scottish life and history, Scott showed himself the master craftsman in depicting national character and national history, under the form of the romantic-historical novel, as no one had done before, and none has done since. His knowledge of Scottish human nature and of Scottish history, and customs, and manners, was as penetrating as it was extensive, and the skill, the vigour, with which he unfolds both character and incident in the course of the story, are inimitable. The humour and the pathos, the comedy and the tragedy of Scottish life and history are so realistically presented that the persons and the times live as if the reader were in touch with the events and characters portrayed. So living is the unfolding picture that, barring the introductions, which the unlearned are apt to find tedious, the reader is held and carried forward through the narrative with an impelling interest and expectation to the end. *Waverley*, like the rest of the series, was anonymous, and within six months after its publication in three volumes, on the 7th July, 1814, four editions, totalling 5,000 copies, were called for. By 1829 about 40,000 copies had been sold. His mastery of the craft appears further in the rapidity with which he poured forth out of the fullness of his knowledge and his genius as a story-teller one after another of these tales. The second half of *Waverley* was written in three weeks; the whole of *Guy Mannering* in six weeks. Seven of the later ones were produced within the five years from 1821 to 1826—among them *The Fortunes of Nigel*, *Quentin Durward*, *Red Gauntlet*. But this overstrenuous production, even for a writer of Scott's facile powers, was telling on his health, and the strain was intensified by the financial crisis which involved him and his printers and publishers—the Ballantynes, in whose business he was a partner—in bankruptcy in the beginning of 1826. He had made the mistake of entering into partnership with the

Ballantynes twenty years before and neglecting to control the financial conduct of the business, which was radically amiss. It was a bad example of a man with a genius for letters entangling himself in a commercial venture for which he had neither time nor aptitude, and he has been severely blamed for handicapping himself by projects of mere moneymaking. But he nobly redeemed his fault by labouring titanically to pay the creditors of the firm by the sweat of his brow throughout the few remaining years of failing health, when he redoubled his output with such productions as *The Tales of a Grandfather*, *The Fair Maid of Perth*, *The Life of Napoleon*, etc.,—the last mentioned a *tour de force* of limited historical value.

In the year following the financial crash—only five years before his death in 1832—he publicly announced his authorship of this marvellous literary creation. Critics like Stevenson have found fault with his style, and one who wrote so much and with so facile a pen could hardly escape such criticism. He was not a master of English prose, for English was still somewhat of a foreign language to the Scottish author of his time. Other critics have dwelt on the imperfections of some of his character sketches, the feebleness of the plots of some of the novels, and of most of their conclusions, the too great liberties taken with history in deference to the exigencies of story-telling. In such a vast array of character and incident criticisms of this kind can legitimately find scope enough, and Scott himself realised the fact better than any of the critics. Like the great writer that he was, he did not hesitate at times to give expression to it. But taking his work as a whole, where is there another such achievement of its kind in any language—an achievement in which national character of such variety of type and national history in so many of its phases are depicted with such masterly handling and with such saving grace of humour? Even from Scott, however, one must not expect more than he had to give. His mind moved in the olden times, where manners, and customs, and conflicts, and policies, and points of view seem in some respects alien to our time. His love of those old feudal days, and his romantic delineation of them have become somewhat of an anachronism to us to whom war and the fighting man are relics of barbarism,

over which, especially with our experience of the madness and misery of brute force in the settlement of international disputes, it is difficult to enthuse ourselves, and against which every cultured man and woman must feel a deep revulsion. We are now intensely interested in things and causes that Scott could perhaps little comprehend and even greatly disliked. He is somewhat conventional, even commonplace in his likes and dislikes, his principles and prejudices. But what is human in it all is perennial and this Scott has re-created in a literary gallery that is immortal.

Carlyle's upbringing at Ecclefechan, in Annandale, was of the simple, rigid type common in the Scottish Calvinist household of the period. The Covenanting tradition and influence survived in the home of James Carlyle, his father, and Margaret Aitken, his mother, who had destined their son for the ministry. The son's predilection was, however, for literature, and by way of a period of schoolmastering at Annan and Kirkcaldy after the close of his career at Edinburgh University (undistinguished except in Mathematics), he ultimately found his true vocation. It was a long struggle with himself, his hopes, and his circumstances. Literary work that was worth doing and would at the same time bring him a living wage was difficult to find, and Carlyle made it more difficult by his rather untractable ways, his contentious, rather doctrinaire spirit, his strong antipathies, and his extreme style of giving expression to them. He could not harness himself to any regular profession except the unsalaried one of writing books, and in this he showed a really gigantic energy and perseverance in doing and enduring. His main study was history as a branch of literature and practical philosophy, and great books in this branch can only be produced by immense application and even drudgery, united with genius. Even so they take years to write, and before the production of the first of them, *The French Revolution*, which appeared in his forty-third year, the problem of how to live was sometimes well-nigh desperate. A *Life of Schiller*, translations from the German, including *Wilhelm Meister*, and articles on German literature had preceded it, and show his deep interest in and admiration for this literature, which he shared with Scott.

With Scott, too, he shared the merit of introducing it to British readers. Merit it still is, in spite of the recent explosion of indiscriminate and unjust abuse of everything German which the war has provoked in ill-balanced minds, and the reviling of those, who, like Carlyle, take the broad as opposed to the narrow insular view of literature.

The French Revolution is a masterly drama of men and events, though historic research has, of course, left it well behind. It is a living presentation of character and action, with the ringing refrain all through that rulers that sow the wind will perforce reap the whirlwind, and that ill-regulated liberty must lead to despotism. In Cromwell's *Letters and Speeches* he has depicted a great personality, though the comments are at times obtrusive and tiresome, and one could do with less of interpretation and apostrophe. The determination to make a hero of him all through, to gloss the forbidding features of the man and his *régime*, especially in his later phase, is overdone. Too much is made of the successful innovator, success of the strong and high-handed type of man being for Carlyle all too extensively the criterion of greatness. The *History of Frederick the Second* is a masterpiece of word painting of personalities and events, and especially of Frederick's battles. But Frederick is a different type from Cromwell, the type of the beneficent despot so dear to the writer, and his statecraft is not worthy of all the glamour that Carlyle has thrown over it. He had difficulty in keeping up the appearance, and had at times more than a suspicion that he was wasting his power on him. His apology for the *Macht-politik* is far from wholesome, and its influence has been by no means an unmixed good. Macchiavelli in politics has had far too long a sway in the government of the world, and one would prefer that he had chosen Luther and the Reformation instead of Frederick and the godless politics of the eighteenth century as the type of German hero and the subject of his *magnum opus*.

He had not many ideas, though he had a matchless power of reiterating them in vivid language throughout these and other works. He was a great literary artist, a painter in words, rather than a great thinker. God, duty, work, sincerity, devotion to

truth at all hazards as he conceived it, are the main contents of his message, which, delivered with prophetic fire and earnestness, wielded an ever widening influence. He braced the younger generation in particular to effort in the practical realisation of these verities. He believed, too, in great men as the formative influence in the world—a belief to which he gave specific expression in his *Heroes and Hero Worship*, and there is inspiration to high thinking and earnest living in the dramatic exposition of the *rôle* of the great man in the various departments of life. But he exaggerates this belief without duly taking account of the progressive growth of forces and ideas which the great man, to whom this progressive growth affords his opportunity, helps materially to translate into achievement. He forgot that with the spread of education, and enlightenment, and power from the few to the many, the great man in his sense becomes less and less operative, and the effect of mass opinion and power becomes ever more so. Unfortunately, too, in his over-emphasis on the right of his " hero " to dominate, he strove to popularise the doctrine that might is right, and however speciously he might clothe the doctrine in the splendour of his rhetoric, he took his *rôle* of moralist far too seriously in this respect. The success of the " hero " is far too much the test of his divine right and mission, though success in the vulgar sense is not his idea of it. He swerved in his later years ever farther from the Liberalism of his earlier period, and came to denounce much that Liberalism stands for. He rightly exposed some of the weak points of the individualism in industry and the national life of his day, with its egotistic proneness to *laissez faire*, and its adherence to the competitive system, which left too many millions in a state of chronic poverty, whilst enriching the comparatively few at the expense of the many. But many of his deliverances on current progressive social and political movements are those of the prejudiced doctrinaire and can only be described as obscurantist and reactionary. In particular, in his defence of the absolutist autocratic system of government against democratic progress, he would have put back the clock to the Middle Ages, or at least to the so-called enlightened despotism of the eighteenth century, which ended in the crash of the French Revolution, and which

this crash had shown to be a complete failure. In spite of his thunderings, democracy was the trend of the present and the future. Had he lived to witness the awful catastrophe into which the lingering autocratic absolutist system of government helped to precipitate the world in the dawning years of the twentieth century, he would have found ample reason to modify his political gospel and his exaggerated estimate of the " hero " in the form of the political and military super-man, with whom the world, if it is wise, will henceforth have nothing to do. He was, too, strangely reactionary in his prejudiced fulminations against science, which he denounced in the spirit of the obscurantist doctrinaire, though his protest against its overweening tendency to dogmatise on matters outside its special sphere had no little force. " Laws without a lawgiver, matter without spirit is a gospel of dirt."

His characteristic command of language and mode of expression he seems to have inherited from his father; his irascible nature, his prolixity, his dour opinionativeness are traceable to the same source. His weak digestion and his excessive sensitiveness contributed to his all too habitual ill-humour with himself and his situation. With that consummate command of words and that faculty of thinking pictorially he was, in such a humour, a terrible censor of men and things—arrogant, ill-natured, mordant, jealous, and often unfair and ungenerous. He was not given to weighing the good points with the bad, or repressing his prejudices, his likes and dislikes under the sense of his own limitations, or of the demands of a tolerant charity. Yet this is not the whole of Carlyle, who could be kind-hearted, generous, and affectionate when his egotism and his dyspeptic imagination left the better impulses of a deep, if somewhat rugged, soul their due scope.

The childhood and boyhood of Robert Louis Stevenson, who was born in 1850, were victimised by chronic bronchitis, and his education was largely a thing of hazard. Schools he intermittently attended—among them the Edinburgh Academy—but he had no love of regular school instruction, though a very bright boy. His father before him had shared this carelessness of school work, and was very indulgent. The University he also attended

without any assiduity or distinction in his studies, and in due course made trial of his father's profession of engineering—also without appreciation. His bent was towards literature, and at twenty-one he definitely abandoned engineering for the law as an avenue towards his prospective goal, rather than as a practical means of livelihood. He was called to the Scottish Bar in 1875, but he had really been serving his apprenticeship in letters by reading in a wide range of literature. He was also learning to write by the indefatigable effort to express himself in the style of the great writers he read. He made his *debut* about 1874 as an author with a number of articles for the magazines, especially the *Cornhill*, whose editor, Mr Leslie Stephen, was a discerning friend. He had been compelled by a serious attack of his old malady, which clung to him through life, and at last brought his days to a premature end in 1894 in far-off Samoa, to winter at Mentone in 1874, and his frequent wanderings in search of health in the ensuing years afforded him much material for the works which henceforth came thick and fast from his pen.

He was an attractive soul, and he made and retained many friendships—in this respect a contrast to Carlyle. His fund of cheerfulness was remarkable, considering that his life was for the most part that of an invalid who spent a great portion of it in bed or indoors when he would much rather have been outside. He just managed to live till he was in his 45th year, and seldom or for long experienced the happy feeling of being really well. Nevertheless, it is a buoyant, bracing spirit that breathes in his letters and books, and made him such a companionable, lovable friend. He was very responsive to life, a man who felt intensely throughout its routine, and possessed the power of communicating the vitalising quality to whatever he wrote. His range was wide—the novel, history, biography, plays, essays, poetry, the didactic—and he reached a high literary standard in all that he essayed, though he did not work all with the same effect. History, for instance, he could only treat in the lightest literary vein, and his application for the chair of Constitutional History at Edinburgh must be regarded almost as a joke or a freak of audacity. The recent establishment of a Stevenson Society

proves the continuance of his influence as a literary force, though the admiration of his disciples in this corporate form is perhaps rather overdone.

For his Scottish tales he drew on the eighteenth century—not a very inspiring one on the whole, but one which, with its intermixture of Jacobite fervour and Whig " douceness," gave sufficient scope for that facility in depicting the romantic and the prosaic sides of life in which he excelled. *Kidnapped* is a masterpiece of the adventure type of story. The succession of incidents in the course of David Balfour's experiences in the brig, with its crew of desperadoes, and with Alan Breac among the Highland mountains, moors, and glens, with the ubiquitous redcoats on their track, arouses and maintains the breathless interest of the reader. The atmosphere of the period of " The Forty-Five " is there, and the dialogues fit the leading characters and reflect the times to the life. The plot is, however, slight, and the grand creative power of a Scott is lacking. But the story is thrilling from beginning to end, and Alan Breac is the very incarnation of a fighting Highlander with a long pedigree and the characteristic strain of Jacobite loyalty and dare devilry. There is more body in its continuation, *Catriona*, the scene of which is laid for the most part in Edinburgh and its environs. It unravels and exposes the political and personal influence that was allowed so flagrantly to interfere with the dispensation of justice in eighteenth century Scotland, especially in the Jacobite period. It hits off the shifts of Prestongrange, the Lord Advocate of the time, to bring to trial and condemn innocent and guilty alike, who happened to be obnoxious to the Duke of Argyll as well as King George, and in David Balfour points the case for conscientious honour and evenhanded justice against such shifts. " This is a conspiracy, not a case," hits the nail on the head, as a description of the method of the crown and its creatures of applying the law against persons obnoxious to the government. *Weir of Hermiston*—the unfinished work which he left behind at his death—deals in part also with the administration of justice in the closing years of the eighteenth century, though here the theme is the harsh methods and the coarse personality of the notorious hanging judge, Lord Braxfield, who is drawn with a

vivid, yet discerning touch. *The Master of Ballantrae* is a weird tale of "The Forty-Five" period, in which he works the sensational vein for all it is worth. Whilst the historical setting, with its picture of pirates and smugglers and other rascaldom, is real enough, the tale is too much of the melodramatic type. One feels that the artist is laying on the colours with a reckless *bravoure* in order to make the hair stand on end. Melodrama is not tragedy.

The periodical literature represented by the reviews that sprang up in the first quarter of the nineteenth century was largely influenced by the political currents of the time. Toryism had long been supreme under the dictatorship of Henry Dundas, the first Lord Melville, the colleague of Pitt, the dispenser of patronage, and therefore the moulder of Scottish political opinion. The franchise was exercised by a couple of thousand county voters and the burgh councils in the Tory interest. But the advancing prosperity of the country and the influence of the French Revolution were, at the opening of the century, bringing a stirring of life into the body politic, and the rising Whig reaction was acquiring a hold on the younger generation, as represented especially by the younger spirits of the Parliament House. Jeffrey, Horner, Brougham, with whom Sidney Smith was temporarily associated, were winning their spurs as ardent party men on the Whig side as well as able pleaders. This coterie of daring young wits startled the drowsy Tory atmosphere with the explosion of *The Edinburgh Review*, which, established in 1802, ere long became the aggressive champion of Whig principles. Under Jeffrey's editorship, which lasted till 1829, it became a force to be reckoned with in both politics and literature, though its editor and contributors yielded too much to the temptation, then so strong, to judge of books and men from the party standpoint. They adopted the slashing style which comes so natural to those possessed of infallible opinions, both literary and political. Everything must be good or bad as judged from this standpoint—an essentially uncritical attitude. But in the hands of Jeffrey and his able band of co-workers, it invested the *Review* with an extraordinary power in the moulding of opinion, and it unquestionably contributed to raise the standard in litera-

ture. Naturally it produced a Tory rival in *The Quarterly Review*, with Gifford as editor, which dates from 1809, and another in *Blackwood's Magazine*, launched, under the name of *The Edinburgh Monthly Magazine*, by the Edinburgh bookseller and publisher and rival of Constable, the publisher of *The Edinburgh*. *Blackwood's Magazine* was as lively and slashing on the Tory side as Lockhart, Wilson, and Hogg, and other anonymous contributors could make it. These three have survived into the twentieth century. So has the more popular *Chambers's Journal*, founded by the brothers Chambers in 1832. But *Tait's Magazine*, which was started in the same year and championed more advanced Liberal views, only lived fourteen years. *The North British Review*, which espoused the same cause and combined with it a religious element, flourished from 1844 to 1871.

The nineteenth century also witnessed a marked extension of the newspaper. Several of the older Edinburgh journals survived from the eighteenth century till far into the nineteenth, among them being *The Edinburgh Advertiser*, whose proprietor, James Donaldson, left his fortune to build and endow the Hospital of this name; *The Caledonian Mercury; The Edinburgh Weekly Journal*, of which Sir Walter Scott and Mr James Ballantyne became the proprietors; and *The Edinburgh Evening Courant*, which expired in 1886. Among the numerous newcomers one of the most important was, and still is, *The Scotsman*, started in 1817 by Mr Charles Maclaren and Mr William Ritchie as the organ of the Reform party, to which it rendered yeoman service in spite of the obloquy heaped upon it by Blackwood. J. R. McCulloch acted for a couple of years as editor, when Mr Maclaren took his place and continued his editorial function till 1845. He was followed by Mr Alexander Russell, among the most hardhitting and facetious of editors, who greatly increased its circulation after it became, in 1855, a daily. A kindred spirit took his place as editor in 1876 in Robert Wallace, who had previously occupied the chair of Ecclesiastical History in Edinburgh University, and ultimately became a barrister and member of Parliament for East Edinburgh, and was succeeded by Dr Charles A. Cooper, who in 1906 was followed by Mr J. P. Croal. In addition to the ability of its editors, the enterprise of its pro-

prietors, Mr John R. Findlay and Mr James Law, in the application of improved methods for the production and distribution of the paper materially contributed to its wide circulation. The reduction of the price to a penny in 1855, the starting of *The Scotsman* Express to Glasgow in 1872 and to Hawick in 1898, the establishment of its own telegraphic communication with the London office, the substitution for the middleman, in the shape of the wholesale agent, of the local agent for the sale of the paper were among the factors that built up the large circulation of to-day. It has, consequently, become a great advertising medium, the number of advertisements in a single issue rising at times to 5,000, filling over 90 columns of the paper. In politics it swerved, towards the end of the century, from the doughty Liberalism of former days. Since the Home Rule controversy of 1886 it has flown the Unionist flag, and might now be described as, to all intents and purposes, a Conservative organ, as the term is understood nowadays. Its present more staid tone and its more exclusively political character are among the fruits of this transformation. It devotes less space to literature and to the general interest type of article than was the case in the days of its more exuberant period. It has, however, outlived all its daily rivals—the venerable *Courant*, *The Witness*, which, under the brilliant editorship of Hugh Millar, flourished in the period of the Disruption controversy; *The Daily Review*, *The Scottish Leader*—and still reigns supreme as the leading Edinburgh daily paper. *The Evening Dispatch*, which issues from the same office, has also a large circulation. The only other Edinburgh daily, which succeeded in obtaining a large circulation and was established in 1873 by the Messrs Wilson, is the Liberal *Evening News*.

Of the newspapers published in Glasgow at the beginning of the nineteenth century the most important were *The Herald*, *The Courier*, and *The Chronicle*. Of these *The Herald* has maintained a vigorous life up to the present, and vies with *The Scotsman* as the leading Scottish daily. It is the older of the two, having been founded in 1783, under the title of *The Glasgow Advertiser*. Its founder was John Mennons, a printer who migrated from Edinburgh to Glasgow, and assumed as partners,

first Richard Cameron, then his son, Thomas Mennons, and, in 1803, Samuel Hunter. Mr Hunter acted as editor till 1837, and his effigy as an anti-Reformer was on several occasions burned at the Cross by his political opponents. It survived its unpopularity over the Reform Bill, and under his successor, G. Outram, who began life as a briefless member of the Scottish Bar and occupied the editorial chair for nearly twenty years, it was again in hot water owing, this time, to its support of Free Trade, which alienated many of its Tory readers. In 1859 it expanded from a tri-weekly into a daily paper, under the editorship of James Pagan. From 1870 it passed under the direction of a succession of men of eminent ability in W. Jack, afterwards Professor of Mathematics in Glasgow University; Dr Stoddart, Dr Russell, Dr Wallace, and its present editor, Sir Robert Bruce. Under Dr Stoddart's auspices the Liberal tendency of its politics became more marked. But, like *The Scotsman*, it took the anti-Gladstonian side in the Home Rule controversy, though, like it, it has come round to the Home Rule legislation of the present Government, which its former Liberal opponents may perhaps regard as a sign of grace! It has adopted the successive improvements in machinery from the hand-worked press to the Hoe press, electrically driven. In the collection, production, and distribution of its material, it is second to none among the British Press, having, like *The Scotsman*, its private wires from London, and in addition to its large staff of sub-editors and reporters, its correspondents not only throughout the country, but in many parts of the world. It, too, is an advertising medium of the first rank. It has its special trains connecting with the south, east, and north of Scotland, and in virtue of the rapidity of this communication, it is obtainable every day at Aberdeen at 7.30 a.m.; Inverness, 9.35; Stranraer, 6.10; Belfast, 8.55; Carlisle, 8.18; Newcastle, 9.40; and London, 4.10 p.m. It issues in *The Evening Times* a widely-read evening paper, whose circulation on special occasions reaches a total of between 300,000 and 400,000, and in *The Bulletin* a daily picture paper. Besides being a first-class organ of political opinion, which might be described as moderately Conservative, it has long been a weighty authority on industrial, shipping, and commercial ques-

tions, and has also devoted considerable space to the discussion of literary and historical subjects.

The leading Glasgow Liberal paper during the second half of the nineteenth century was *The North British Mail*, founded in 1847. At its decease its place as the exponent of Liberal opinion was taken, in 1901, and is still held, by *The Daily Record*. The evening papers, *The Citizen*, a Conservative organ, and *The Evening News*, which may be described as Independent, are also important exponents of opinion. Dundee and Aberdeen, as centres of a large population, also possess newspapers of more than local importance in the direction of public opinion. *The Dundee Advertiser*, which was established in 1801, deservedly maintained a high reputation throughout the century as the champion of advanced Liberalism, and has done much to diffuse its political creed among the masses through *The People's Journal*, largely read in the rural districts of Scotland. *The Dundee Courier*, which was started in 1816 as a Conservative organ, has also a considerable circulation in central Scotland. To *The Aberdeen Journal*, founded in 1746, belongs the distinction of being the oldest existing Scottish daily. The first number contained an account of the Battle of Culloden, fought nearly 100 miles to the west of the city two days before its issue. In politics it was neutral, and it was long without a rival in the north-east until *The Aberdeen Chronicle* was started by John Booth in 1806 to advocate advanced Liberal views. Sixteen years later the latter was merged in *The Aberdeen Herald*, which was later overshadowed and ultimately displaced by *The Aberdeen Free Press*, founded by Mr McCombie in 1855 in the Liberal interest, and, like the *Journal*, still maintaining a vigorous life. It is not too much to say that intellectually *The Free Press* stands in the forefront of Scottish journalism. Besides these outstanding organs of public opinion all the Scottish provincial towns have their local press, such as *The Banffshire Journal*, *The Inverness Courier*, *The Fife Herald*, *The Perthshire Advertiser*, *The Perthshire Courier*, *The Ayr Advertiser*, *The Dumfries Standard*, *The Galloway Advertiser*.

12. Printing and Publishing

The rise of periodical literature and the newspaper press in Scotland was contemporary with the development of the publishing, bookselling, and printing trades. In the eighteenth and early nineteenth centuries publishing was combined with the retailing and sometimes the printing of books. The most notable of the Edinburgh booksellers and publishers in the second half of the former century were Elliot, Creech, Bell & Bradfute, Hamilton & Balfour, and James Donaldson. During the first half of the nineteenth the advent of Scott gave scope to the energies of James and John Ballantyne, Archibald Constable, and William Blackwood in the same field. Scott was, in fact, a partner in the printing and publishing business of the Ballantynes. In James Ballantyne's printing house (Paul's Work in the North Back of the Canongate, from which it was removed in 1870 to the Newington district), the Waverley novels were set up and printed by the hundred thousand, in addition to an ever increasing volume of miscellaneous literature. "In 1822 no fewer than 145,000 volumes issued from the Ballantyne Press, all from the pen of Scott—an extraordinary number of volumes in those days of hand presses; and this leaves out of reckoning work done for other authors and publishers." Constable and Blackwood also enjoyed the distinction of publishing some of the anonymous works which were taking the world by storm, though their author quarrelled with both of them. The disaster which befell James Ballantyne and Archibald Constable in 1826 and involved Scott in the tragic, but heroic task of the closing years of his life of toiling to pay off Ballantyne's creditors, who, in virtue of his partnership, were also his, left the house of Blackwood supreme among the Edinburgh publishers for the time being. About the same time the brothers Chambers founded the publishing business which has done so much for the diffusion of knowledge among the people. Another of the same type was founded about the same time by Mr Nelson, who had started as a bookseller in 1798. Other prominent firms maintained the earlier reputation of the Scottish capital as a publishing centre, notably

those of A. & C. Black, who in 1827 acquired from Constable's Trustees the copyright of the *Encyclopædia Britannica*—the first edition of which had been published by William Smellie in 1771—and that of Scott's works in 1851; T. & T. Clark, who started the famous series of translations of German theological works; Edmonston & Douglas, the latter editing, as well as publishing, *Scott's Journal*; Oliver & Boyd, Oliphant & Co. More recently the Edinburgh publishing trade has tended to migrate to London, and while some of the leading publishers, like the Messrs Black, have removed their business thither, others, like the Blackwoods, have established branches in the British metropolis.

The abolition of the newspaper stamp duty in 1855, the duty on advertisements in 1854, and the duty on paper in 1861, by cheapening the price and increasing the circulation of books and journals, had a quickening effect on the printing as well as the publishing trade. In this industry Edinburgh took the lead, not only in Scotland, but in Britain. "For many years," says Mr Strachan in *The Scottish Bankers Magazine* (October 1911), "Edinburgh has been looked upon as the seat of production of the finest book printing in the world; and, in support of this statement, it may be mentioned that a considerable portion of Edinburgh's costly book-work comes from England. The greatest London publishers have nearly all their best work printed in the Northern capital; and it is no exaggeration to say that to a large majority of the reading public the fact that a book bears the hallmark of a leading Edinburgh firm lends additional value to its possession. Cheapness cannot explain the partiality of London publishers to Scottish workmanship, although it must be admitted that by employing female labour the Scottish firms gain an advantage over their southern competitors. But the cost of carriage and other items would certainly swallow up any saving made on the printing expenses. Again in the case of many publications it is impossible to estimate, even approximately, what will be their ultimate cost. These things considered, it may safely be assumed that the secret of our printers' renown lies in the artistic beauty and accuracy of their productions."

The oldest of the existing firms is that of Neill & Co., which

dates back to 1749, and was at first known under the name of Hamilton & Balfour. Those of Oliver & Boyd, and Pillans & Wilson have also survived from the eighteenth century. Among the more important of those established in the nineteenth are, besides the Blackwoods, Ballantyne & Co., and T. & A. Constable, R. & R. Clark, and Morrison & Gibb. The growth of the industry has also been greatly accelerated by the remarkable improvement in the machinery for printing newspapers and books. The progress of newspaper printing is strikingly represented in the case of the leading British newspaper, *The Times*. At the beginning of the nineteenth century the hand press in use was of cumbrous construction, and printing was a slow and laborious process. Up to 1814 twelve hand presses, working at the highest pressure, were required to print an edition of 10,000 copies of *The Times* between 12 at midnight and 6 a.m. The application of steam to the press greatly increased the output, and two steam driven machines, contrived by Koenig in this year for Mr Walter, proprietor of *The Times*, produced 1,100 impressions per hour. The improvement is thus described in an article of the issue of 28th November, 1814. "After the letters are placed by the compositors and enclosed in what is called the "forme," little more remains for man to do than to attend upon and watch the unconscious agent in its operations. The machine is then merely supplied with paper, itself places the forme, inks it, adjusts the paper to the form newly inked, stamps the sheet, and gives it forth to the hands of the attendant, at the same time withdrawing the form for a fresh coat of ink, which itself again distributes, to meet the ensuing sheet now advancing for impression, and the whole of these complicated acts is performed with such a velocity and simultaneousness of movement that no less than 1,100 sheets are impressed in one hour." The Koenig machine was modified and improved by Messrs Applegarth & Cowper in 1827 so as to print from 4,000 to 5,000 copies per hour. The next improvement was the substitution for the flat or plane "forme," containing the type to be printed, of a curved or rotary form by attaching the type to a cylindrical surface. The idea had occurred to William Nicholson in 1790, but it was first successfully applied by Applegarth in 1848, who by this contrivance

increased the output of *The Times* to from 10,000 to 12,000 per hour. Further improvements, including the curved stereotype plate of the type to be printed (stereotyping having been invented by William Ged, a goldsmith of Edinburgh, in the eighteenth century and perfected by Tilloch and Foulis of Glasgow), and the printing of both sides of the sheet simultaneously, were made in 1868 for the Walter Press by Messrs MacDonald & Calverley. Another improvement was the substitution for the hand setting of type of the Kastenhein and the Wicks composing machines, with their later developments, the Linotype, the Monotype, and the Singertype. The Walter Press gave place in 1895 to the Hoe machine, and later the Goss machine, which are capable of turning out 150,000 folded copies of *The Times* per hour.

The large Scottish newspapers have not lagged behind *The Times* in the adoption of modern machinery. In the composing room of *The Scotsman*, for instance, thirty-two Linotype machines produce seventeen columns of type per hour. The stereotype plate is made and printed within ten minutes after leaving the composing room. In the machinery hall five Hoe presses of varying capacity, driven by electricity, are capable of printing, cutting, folding, and counting 174,000 copies of a twelve page paper in an hour. The proprietors of the *Glasgow Herald*, who first adopted the Hoe machine in 1876, introduced in 1911 a double sextuple Hoe press, capable of printing, cutting, folding, and counting 120,000 copies of a twelve page paper, and 60,000 copies of one of twenty-four pages, per hour.

A large variety of these fast printing machines have been contrived for book and general printing, as well as for the production of newspapers, and the revolution which their invention and application have wrought in the printing trade has been taken advantage of by Scottish printers. In Scotland the first steam printing machine was introduced in the establishment of Messrs Ballantyne about 1817, and to Mr Thomas Nelson is due the credit of inventing the model of a rotary stereo press, which was exhibited by him in the International Exhibition of 1851. An idea of the progress in the printing art in Edinburgh may be best formed from a comparison between the daily routine in Ballan-

tyne's press in the early years of the nineteenth century and that of a modern up-to-date Scottish printery. Entering the long case room in Paul's Work in, say, the year of Waterloo, " one would find," to quote from *The Ballantyne Press*, " about thirty or forty compositors, busily dipping their fingers into cases of types—spelling, capitalising, and punctuating line after line from the manuscript or ' copy ' before them—amidst the joke and chaff flying among themselves, and the noisy hammering of wooden ' mallets ' at the imposing tables or ' stones ' down the centre of the room, on which the ' formes ' of type were being corrected and got ' ready for press.' A second case room, with about twenty men, was on another, higher flat; adjoining this, in course of time, was the stereo room.

" Beyond the long case room, on a slightly different level, was a fairly large room, partitioned off like so many sentry-boxes, occupied by that much maligned, but indispensable class, the printer's readers, each with his attendant satellite or ' devil.'

" While the formes were being prepared for the press, the damping room below was called into operation. It was here that the paper to be printed was damped, in order that it might take on better the impression from the type. This process is now almost abandoned, except in the case of some special make of paper, as printing papers are now made with a texture that does not require damping. In the early days of Paul's Work, however, it was very necessary.

" The formes of type and the paper being ready, the pressmen put the formes on the press-bed, and after ' making ready ' the pages of type to ensure a uniform impression and colour on the printed sheet, proceeded to work off the formes. In the early days of last century, before the advent of the steam printing machine, the work of the hand pressmen must have been a constant strain on their physical powers. A ' token ' of 250 sheets per hour was the ordinary output; they had to lay the sheet of paper on the tympan and roll it under the press, pull the bar to take the impression, roll back, and lift off the printed sheet—all this for 250 times an hour for ten or twelve hours each day was no light task. In those days also, prior to the invention of the hand roller, the ink had to be put on the formes of type by

means of handballs or 'dabbers,' and this, too, took a much longer time. The sheets of a book having been thus printed, either by hand press or by machinery, were next sent to the drying room, and hung over horizontal bars, one above the other, being put up or taken down by means of long peels. When thoroughly dried the sheets were subjected to a smoothing process between highly glazed boards under great pressure, and were then ready for the bookbinder."

Compare with this the marvellous daily output by means of the most up-to-date machinery in a modern Scottish book factory, as described by Mr Strachan in *The Scottish Bankers Magazine* for October 1911. "Inside we find two great floors, the lower mainly devoted to storage and packing. The upper floor forms one long, well-lit, and well-ventilated workroom, filled, but not crowded, with machinery. No means of propulsion is visible, there being an absence of the usual belts and shafting. Electricity is the motive power. Below the under floor is a long chamber entirely occupied with the motors, starting gear, and suction pumps used to drive the machinery above.

"We next pass into a small room off the great hall. Here a handful of men sit before seeming typewriters. By depressing the keys the operators punch in rolls of paper two holes, which, according to their position, represent the character required. These perforated rolls then pass through the casting machines, currents of air controlling the casting of the letters which the holes represent. Long columns of new type are rapidly formed, which are removed to be proved, corrected, and made up into pages. The speed of these machines, as compared with hand setting, is enormous and, in consequence, much more economical. The pages then go into the stereotyping department, where casts are taken from the type, and the printing 'plates' made, which are beat into semi-cylindrical shape.

"At one end of the upper floor room are ranged in line six rotary machines of the type usually used for newspaper printing. Behind these runs an overhead railway, which carries to each press gigantic cartridges of paper. The plates having been placed in position on the cylinders of the machine, a touch sets the huge 'rotary' in motion, and at one revolution of the two

cylinders a sheet of 96 pages is instantly printed on both sides. This sheet is automatically cut from the roll, a set of blunt knives descend, and the sheet is folded into those neat signatures the size of the book to be. A signature, it may be explained, is a section of 16 or 32 pages. A complete book consists of so many of these sewn together. Each machine prints three signatures, and each book consists of three to six workings, so that as many machines are simultaneously producing the signatures of one book. As the piles of these rapidly grow they are placed in long troughs down which they are slowly carried on endless chains. *En route* they dry, and the various signatures forming the complete book are collected together in correct order and conveyed to the sewing machines, which seize them and do the rest of the work automatically.

" The work now begins to resemble a book, but the edges are rough, and it has no cover. A guillotine trims the edges, another machine rounds the back, and still another glues on a lining of ' mull.' The coloured frontispieces are then pasted in. . . .

" Meanwhile, in another corner of the building, the cloth cases have been prepared. Case-making machines are marvels of ingenuity. A roll of cloth passes over a gluing roller, strawboards fall into their places on the glued cloth, the paper that lines the back attaches itself; the cloth is cut, and the edges dexterously folded over the edges of the boards. Gold-leaf is laid by hand on the back of the cases, which are then rapidly struck with their design and title. At the casing-in machines book and cover are swiftly attached, after which they are placed under hydraulic pressure in order that any tendency to curl may be overcome. Released from this, they are returned to the ever-moving troughs and conveyed to ' chutes,' down which they fall to the packing room below.

" A factory such as that described produces two volumes in three seconds, or nearly 120,000 per week. About 350 miles of paper, 15 miles of cloth, and 5 miles of strawboard are consumed in the manufacture of this quantity."

Glasgow comes next to Edinburgh as a printing and publishing centre. From the end of the eighteenth century printing de-

veloped into a large industry. The University Press, started by the brothers Foulis about the middle of this century, " in the course of a few years," in the words of Dr Murray, " made Glasgow printing famous throughout Europe." " I read Homer," said Gibbon, " with most pleasure in the Glasgow folio." " The work so auspiciously begun by the brothers Foulis," continues Dr Murray, " has been carried on by a succession of excellent printers, and the Glasgow press is now no inconsiderable factor in book production in the United Kingdom. The printing and distributing of books in numbers was not commenced in Scotland until about 1796, but quickly developed, especially in Glasgow, where at one time five-sixteenths of the trade was carried on." Among the more notable of the Glasgow printers in the nineteenth century were the Duncans, Blackie & Son (formerly Kuhll, Blackie & Co.), Collins & Co., MacLehose & Co. (the University Press), Wardlaw & Cunningham, McCorquodale & Co., Hodge & Co., Chapman & Duncan, Orr & Sons, Lumsden & Son, W. & D. Mackenzie. Blackie, Collins, and MacLehose also developed an extensive publishing business, and among other publishing firms may be mentioned those of Fullarton & Co., Smith & Sons, Lumsden & Son. The practice of selling books in numbers was first started in Glasgow by Fullarton, and was developed by the Messrs Blackie, and by W. Mackenzie. It is significant of the extent of the Glasgow printing and publishing trade that no fewer than five of the Lord Provosts of the city during the nineteenth century were printers and publishers, viz., James Lumsden, father and son; Andrew Orr, John Blackie, and William Collins.

Type founding also became a considerable branch of industry in Glasgow from about the middle of the eighteenth century, when Alexander Wilson set up his type foundry in the village of Camlachie, and cast the types which made the brothers Foulis famous. In the nineteenth century, the firms of Hutchison & Brookman (University printers), Prentice & Co., and D. Macbrayne & Stirling (Macbrayne of subsequent Clyde steamboat fame) acquired prominence as type founders. The allied industry of engraving and lithography owed much to the fine workmanship of Joseph Swan in the middle of the century, and the

firm of Maclure, MacDonald & Co. has long carried on an extensive business as lithographers and lithographic printers.

13. Art

Raeburn's formative influence, in the domain of portraiture, on the rising Scottish school, is apparent in the work of his contemporaries and successors—of George Watson, Watson Gordon, Graham Gilbert, and Daniel Macnee. George Watson became the first president of the Scottish Academy on its formation in 1826, and his portraiture has so much superficial resemblance to Raeburn's that in the judgment of Mr Caw, " the unscrupulous will some day pass off the best of his portraits (that of himself and of Benjamin West, the President of the Royal Academy, for instance) upon the unwary as examples of the greater painter." " Workmanlike and worthy of respect," is the estimate of the same critic. The finest of those of Watson Gordon, on the other hand, are said to approach Raeburn's in merit. He certainly fell heir to Raeburn's popularity and painted many of the notables of his time up to his death in 1864. He reached his highest level in his later period in his portraits of Lord Cockburn, Henry Houldsworth, the Provost of Peterhead, David Cox. He was elected a member of the Royal Academy in 1851 and became President of the Royal Scottish Academy in 1850 in succession to Sir William Allan. Graham Gilbert, who, after his marriage to a Glasgow heiress, settled in the western city, came near in his " James Hamilton " and " John Gibson " to challenging Watson Gordon's supremacy, and, as his " Love Letter " shows, excelled him in the portrayal of feminine charm, in which the latter was distinctly weak. Daniel Macnee long shared with Graham Gilbert the patronage of the western city before becoming President of the Royal Scottish Academy in 1876, when he removed to Edinburgh. He has been described as " an understudy of Raeburn," and his best work, of which his portraits of Dr Wardlaw, Charles Mackay as Bailie Nicol Jarvie, and " The Lady in Grey " are the finest examples, deserves the description : " None of them," says Dr McKay, in reference to the successors of

Raeburn, " take equal rank with the founder of the school, but three of the group may be said, by the addition of individual qualities, to have widened the scope of native portraiture. If a selection of the more notable works of Watson Gordon, Graham Gilbert, and Macnee were aligned with an equal number of representative Raeburns, though the former would suffer by contact with Sir Henry's masterly technique—the brilliant *ensemble* that takes one by storm—there would nevertheless be found an advance in that intimacy of observation and characterisation which is a dominant note in the best production of recent times."

Like Raeburn in portraiture, David Wilkie (1785-1841) exercised a formative influence on Scottish painting in the department of *genre*, i.e., in the depicting of scenes or subjects from life. Born in 1785 in the manse of Cults in Fifeshire, he became a pupil of John Graham in 1799, when Raeburn was already famous. At the age of 19, after he had finished his training under Graham, he gave in " Pitlessie Fair " a foretaste of his genius as a *genre* painter. In 1805 he went to London to study in the schools of the Royal Academy, and in the following year sprang into fame with his " Village Politicians," which he sent to the Academy's Exhibition. Three years later he was elected an associate, and in 1812 a member of the Royal Academy. These distinctions, to be followed later by the appointment of Painter in Ordinary to George IV., and a Knighthood from William IV., were richly merited by the developing mastery revealed by " The Blind Fiddler," " The Rent Day," " The Village Festival," which belong to the years between 1806 and 1812, and show the influence of Teniers and Ostade on his work. In the following year the Exhibition contained what is perhaps the most popular of all his creations—" Blind Man's Buff." In the next ten years he produced most of his characteristic work, including " The Penny Wedding," in 1819; " The Reading of the Will " in 1820, and " The Chelsea Pensioners " reading the news of Waterloo in 1822, for the Duke of Wellington. A sojourn on the Continent for reasons of health, which lasted several years, led him to essay the grander style of the Spanish masters and to devote himself to portraiture and pictorial subjects. The change of style is pronounced by the critics to be a

lapse into an atmosphere in which the real Wilkie is not in his true element. " In those life-size portraits and illustrations of long past or recent history," says Dr McKay, " one recognises many admirable artistic qualities, but no longer the unique Wilkie." Even in his true sphere—that of reflecting the homely incidents of real life—he has his limitations. " Although," says Mr Caw, " he drew his subjects from the life of the Scots peasantry, he only touched it at certain points." It may be said, nevertheless, that he did for old Scottish life in the realm of art what Scott did for it on a grander scale in that of fiction, and Burns in a more restricted degree in that of poetry. He depicted its characteristic features at a time when character and custom were undergoing a transition in keeping with change in the social and industrial life of the country. True, his settlement in London enlarged the scope of the subjects treated, which include characteristic scenes of English life. " The Village Festival," for instance, is characteristically English, and the setting of " Blind Man's Buff " is also English. But there is no mistaking the Scottish flavour of such productions as " The Blind Fiddler," " The Penny Wedding," " The Rent Day." They were and have continued to be extremely popular in Scotland, and exercised a marked influence on the work of Scottish *genre* painters of his own and the immediately succeeding generations, such as Alexander Fraser, John Burnet, and William Kidd. Later in the century this influence was perpetuated in the humorous scenes of Erskine Nicol (1825-1904), and the pathetic presentations of Thomas Faed (1826-1900).

William Allan (1792-1850), the second President of the Scottish Acadamy, may be described as the pioneer of the historical *genre* in Scotland. In early life he spent some years in Russia, and later, besides revisiting Russia, travelled in Italy, Greece, Asia Minor, and Spain. He portrayed scenes of oriental life suggested in the course of his travels. His intimacy with Scott quickened his interest in the history and romance of his own land, which found pictorial expression in a series of scenes from the lives of Bruce, Knox, the Regent Murray, etc. " They are not distinguished by any great artistic merit, and his work is more interesting as inaugurating a new development in Scottish

painting than on its own account." As the master of Harvey, Duncan, and Scott Lauder, who studied under him in the Trustees Academy, his influence in this respect was considerable. All three drew largely on the Waverley Novels for their historic material. Duncan, who died in 1845 at the age of 38, excelled as a colourist in his dramatic representations of episodes in the life of Prince Charles, which gained him the associateship of the Royal Academy, and his "Martyrdom of John Brown of Priesthill." Sir George Harvey (1806-76), who succeeded Watson Gordon as fourth President of the Royal Scottish Academy, also reached a high level in his most telling historic pictures ("Drumclog," "Quitting the Manse," "The Sabbath in the Glen"), and, besides, treated *genre* subjects with remarkable spirit in "The Schule Scailin'," "Sheep Shearing," etc. Lauder was more distinguished as master of the Trustees Academy than as a painter, but he scored one striking success in "The Trial of Effie Deans."

As in the case of Thomas Duncan, David Scott's career (1806-49) was cut short by a comparatively early death, and was, besides, clouded by melancholy begotten of ill-health and ill-deserved lack of recognition. A brilliant colourist with a powerful imagination, but defective draughtsmanship, he also may be classed among the historical painters of the earlier nineteenth century, though his predilection was for the abstract rather than the concrete side of his historical material. Pictures like "The Traitor's Gate" and "The Spirit of the Storm," of which the Duke of Gloucester and Vasco da Gama are respectively the subjects, are instinct with the meaning which it was his main purpose to convey. It was the significance of action, rather than the action itself that interested him, and in these pictures he succeeded in giving expression to the thought and emotion underlying the scene with powerful effect. Later in the century the historical or semi-historical subject found capable exponents in Sir Noel Paton (1821-1901), Robert Herdman (1829-88), and Sir W. Fettes Douglas (1822-91). "Luther at Erfurt" is one of Paton's finest creations. But his main interest was in religious allegory and in the realm of fancy, and the pictures in which he gave expression to religious and moral veritics, such as "The

Pursuit of Pleasure," or sought to visualise the fairy world (" Oberon and Titania "), display an exuberant imagination and a richly inventive faculty, and won an enormous popularity. Herdman also successfully used history with a moral purpose in such pieces as " A Conventicle Preacher before the Justices," " After the Battle," and " St Columba Rescuing a Captive." Fettes Douglas, who became President of the Academy in 1882, had a predilection for the recondite realm of alchemy and astrology, and his antiquarian interest appears most characteristically in " The Alchemist," " The Visit to the False Astrologer," " The Rosicrucian."

Scottish landscape painting takes its rise with Alexander Naysmyth and his pupil John Thomson (1778-1840), minister of Duddingston, and the friend of Walter Scott. In spite of the varied grandeur and beauty of Scottish scenery, the feeling for nature was long dormant. English travellers in the seventeenth and early eighteenth centuries were repelled by the wild vistas of mountain and moor, and among the strange criticisms of things Scottish in which they indulge none astonishes the modern reader more than their obtuse judgments of the landscape north of the Tweed. The treeless Lowlands in those days might ill compare with the sylvan beauties of England. But even the magnificent panoramas of the Highlands fail to impress the eye of Captain Burt, for instance, who pronounces the mountains " disagreeable "—the more so when the heather is in bloom and the day is clear! Scotsmen themselves for the most part had lost the sense of nature, to which the Scottish poets of the Renaissance period had given expression. In the later eighteenth and the early nineteenth centuries there came a marked awakening of the æsthetic sense, and the new feeling for nature found appreciative expression in *The Seasons* of James Thomson, in Ossian, Allan Ramsay, Burns, Scott, Hogg, and Byron. From literature this appreciation passed into art in the landscapes of A. Naysmyth, John Watson, and especially of the Duddingston minister. The Rev. John Thomson, whilst failing to shake himself free from the conventional manner, was " the first to seize and express fitly the true character of Scottish landscape." Horatio M'Culloch (1805-67), who shows his influence, put on the canvas many

striking studies of Highland landscape, though his art is still, like that of Thomson, hampered by the conventional. The same may be said of his less popular, but eminently deserving contemporary Milne Donald. With Sir George Harvey, who in his later years devoted himeslf to landscape, and J. C. Wintour, it became more realistic, truer to nature, more intimate and personal. This feature is increasingly apparent in the works of Sam Bough—the most vivacious of men and artists—and his intimate associate Alexander Fraser, who, " in determination to paint everything from the thing itself," rivalled the most fervent of the Pre-Raphaelites, and whose art is the outcome of how he saw nature, and a record of what he most admired.

Compared generally with the painting of the first half of the nineteenth century, that of the succeeding period becomes less conventional, and more naturalistic and individualist. This feature is already apparent to some extent in the work of some of the painters already mentioned. It becomes more marked in that of the pupils of Scott Lauder in the sixth decade of the century, to whose teaching it owed much. This period saw, too, the rise of the Glasgow School, which developed independently on impressionist lines, and attained a European reputation and influence. Lauder's pupils are distinguished by the feeling for colour with which their master inspired them from the great Venetian colourists. Brilliancy of colour and the pictorial sense are distinctive features of the works of Orchardson, Pettie, Chalmers, M'Taggart, Cameron, M'Whirter, Peter Graham, and others, in the various branches in which they practised. Other notable painters, though not belonging to this brilliant group, such as Sir George Reid, Robert Gibb, William Hole, Martin Hardie, Ogilvy Reid, J. R. Reid, J. E. Christie, Robert M'Gregor, Robert Alexander, Denovan Adam, have lent distinction to Scottish art in recent times in the departments of historic-domestic *genre*, landscape, portraiture, animal painting. The Glasgow School was the result of a strongly realistic revolt from artistic tradition, and was influenced by French realism. It took definite shape in Scotland in the eighties, and among its pioneers were James Guthrie, James Paterson, George Henry, W. Y. M'Gregor, E. A. Walton, John Lavery, Alexander Roche.

It fought its way to recognition with all the verve of ardent conviction against the prejudice of the Academy, and succeeded by force of merit in winning a leading place in art exhibitions at home and abroad.

Scotland has thus within 100 years steadily developed an art which is strong in the delineation of Scottish character, domestic life, history, and landscape. It reflects the national temperament, and though foreign influences—Italian, Dutch, Spanish, or French—are traceable throughout, the national element is unmistakeable. "No one familiar with the history of painting in Scotland," says Mr Caw in the luminous resumé which concludes his highly competent and suggestive review of *Scottish Painting Past and Present*, "since it became a living art in the pictures of Raeburn, Wilkie, and Thomson, will find it difficult to trace a more or less connected development, and to find in its successive phases qualities, subjective, emotional, and technical, eminently characteristic of the Scottish people." For a small country to have produced so much in this domain of culture within little more than a century is a remarkable achievement. Still more remarkable that so much of it has attained a very high level of excellence, and that in more recent times it has commanded the homage of Europe as "one of the few and original manifestations in modern painting."

To the work of Raeburn and Wilkie is mainly due the early development of art in Scotland as a distinctive feature of Scottish culture and an influence in the national life. Some share of the merit belongs, however, to the Trustees Academy, and especially to the teaching of John Graham, who became master in 1798, and among whose pupils were David Wilkie, William Allan, and John Watson Gordon. Originally a school of applied art, it become under Graham also a school for the training of artists, and under his successors Andrew Wilson and Sir W. Allan, who was appointed master in 1826, when accommodation was assigned to it in the Royal Institution, this feature of the instruction was continued and developed. The appointment of Scott Lauder in 1852 greatly increased its formative influence. In 1808 a beginning was made in the direction of professional organisation by the formation at Edinburgh of the Society of

Incorporated Artists. The Society held annual exhibitions for several years, and these exhibitions tended to arouse a wider interest in painting. Hitherto, according to Lord Cockburn, there had been no public taste for art, and, except for Raeburn's works, no market for the productions of Scottish artists. A marked change for the better now set in, and these exhibitions were a distinct success. In five years' time a sum of £1800 had been accumulated. Unfortunately, the majority of the members resolved in 1813 to distribute this sum among themselves instead of devoting it, as Raeburn and others advised, for the purpose of establishing a permanent body. The enterprise accordingly lapsed, though the annual exhibition was continued till 1816. Three years later another organisation took shape in the " Institution for the Encouragement of the Fine Arts in Scotland," which proposed to attain this end by holding annual exhibitions of ancient masters, and devoting the proceeds to the relief of deserving, but impecunious artists. The ancient masters in Scotland were, however, too few to furnish an attractive exhibition, and ere long it was found necessary to include the works of living artists. In 1826 it found a location in the Royal Institution which the Board of Manufactures had built on the Mound. Unfortunately, friction arose between the management and the resident artists, who were allowed no voice in the administration, and in this year the latter determined to establish a separate professional organisation or academy, and to apply for a royal charter. The request was refused, and the boon accorded instead to the Institution. The artists, nevertheless, persevered in their undertaking, and for a couple of years rival exhibitions were held by the two bodies. In this struggle the artists, backed by the public support, emerged victorious. The Royal Institution agreed to confine its attention to the acquisition of " ancient pictures as a nucleus of a national collection," and left to their rivals the exhibition of contemporary works. It was from this clash of rival organisations that the Royal Scottish Academy, which received its charter in 1837, was evolved. The Academy held its exhibitions in the Royal Institution, and there was further friction with the Board of Manufactures until in 1855 it at last obtained, through Government intervention, the

benefit of a separate establishment in the National Gallery on the Mound, which was erected from funds furnished by Parliament and the Board respectively.

Like Edinburgh, Glasgow also had its difficulties in promoting the interests of art. The Diletante Society commenced a series of exhibitions in 1838 which continued annually for about a decade. An Art Union was started in 1841, and later the West of Scotland Academy came into a struggling existence. These attempts proved, however, ultimate failures, and " it was not till the Institute of the Fine Arts was founded in 1861 that the advantages of well organised and representative annual exhibitions were secured for ' the second city.' " Six years later the Glasgow Art Club was started, and ultimately became the centre of art life in Glasgow with its own annual exhibition. The Royal Scottish Water Colour Society, founded in 1878, has also its headquarters in Glasgow. Other artist societies have come into existence in both Edinburgh and Glasgow—the Society of Scottish Artists, the Glasgow Society of Artists, the Society of Lady Artists—and also at Aberdeen, Dundee, and other provincial towns.

Art collections, so necessary for the cultivation of the public taste as well as for the education of artists, are available for both purposes in the National Gallery on the Mound, the National Portrait Gallery in Queen Street, due to the enlightened generosity of Mr Findlay of Aberlour; in the Corporation Museum of Art at Kelvingrove, Glasgow; and in the Art Galleries of Dundee, Aberdeen, Stirling, and other towns. Art education has also undergone a marked development. In 1858 the Trustees Academy was affiliated to the Science and Art Department in London, the life class being transferred to the Royal Scottish Academy. In 1899 the function of the Science and Art Department in Scotland passed to the Scottish Education Department, and with its co-operation the Edinburgh Town Council took the lead in establishing a new and thoroughly equipped College of Art by providing the site on which the new building was erected from a fund derived from a large Government grant, supplemented by public subscriptions. Glasgow has not been behind Edinburgh in the provision of a first-class art school,

which since 1890 has provided a comprehensive art training, and, like the Edinburgh School, it is recognised by the Scottish Education Department as a central institution for Glasgow and the West. The well equipped Aberdeen School possesses the same status, and performs the same function for the northern district. Edinburgh is the only University which possesses a chair of the Fine Arts, but art teaching is included in the curriculum of a considerable number of secondary schools.

14. Religious Life

Ecclesiastical contention and theological discussion have entered very deeply into Scottish social life. Since the Reformation, Scots folk have shown a keen interest in and appetite for questions of church polity and religious belief. The nineteenth century had its fair share of this controversy and discussion, not only in church courts and in the Press, but in the homes of the people. At the beginning of the century the spirit of dissent found renewed expression in the evangelical preaching of the brothers Haldane—a revival of that of Wesley and Whitefield in the preceding one—which resulted in the establishment of a number of independent churches. In the middle of it took place the Disruption of the national church over the questions of patronage and the claim of spiritual independence, on which the evangelical party, led by Chalmers, Gordon, Cunningham, Candlish, Buchanan, threw down the gauntlet to the State. For ten years, from 1832 onwards, the land was convulsed by the vehement contentions of the rival parties from the utmost south to the distant north, and the courts both ecclesiastical and secular were kept busy with case after case of popular opposition to objectionable presentees. The Disruption was a convulsive social as well as ecclesiastical event. It carried party passion and religious bitterness into parishes and families all over the land, as well as rent the church in twain. It led to the setting up of a rival place of worship in many villages where the parish church amply sufficed to accommodate the parishioners, and two

ministers were engaged in doing the work of one. So deep was the cleavage that it affected business as well as social intercourse, the Free Churchman lending his patronage to tradesmen of his ecclesiastical way of thinking. It gave colour to party politics, Free Churchmen being mostly Liberal or Radical, their opponents largely Conservative. It intensified sectarian feeling, which tends to confuse religion with particular views of it, and to nurture intolerance towards those who do not share its intense or doctrinaire opinions on the questions at issue. At the same time it had its heroic side, and its beneficent effects. It was the outcome of strong religious convictions as well as party passion, and gave a powerful impulse to the religious life of Scotland as embodied in the manifold and expanding activity of the Free Church. Moreover, it reacted beneficially on the life of the desolated national church. Under the direction of Dr Robertson this church effectively continued the work of extension inaugurated by Chalmers, and in a dozen years raised half a million to erect and endow 150 new parishes. The personal magnetism of Norman MacLeod, the pulpit eloquence of John Caird, the varied learning of Robert Flint, the weighty personality of John Tulloch, the zeal and ability of others of the rising generation of ministers ere long contributed to make good the loss which it had suffered from the secession of so many of its outstanding men, from Dr Chalmers downwards. The abolition of the Patronage Act in 1874, and the introduction of popular election, gave it a stronger hold on the loyalty and affection of the people. This liberal measure, if it went a long way towards meeting the case of the seceders and seemed to justify their action, showed at the same time that, with the exercise of patience and forbearance, they would have attained their end without the extreme expedient of disruption.

Despite the tendency to go asunder over ecclesiastical questions which perturbed the church between the middle of the eighteenth and that of the nineteenth centuries, and culminated in the catastrophe of 1843, a more irenic and less sectarian spirit gradually asserted itself in the Scottish churches during the second half of the latter century. This spirit has, happily, become the dominant one during the first two decades of the

present century. In 1820 a foretaste of it was already forthcoming in the union of the Burghers and Anti-Burghers into the United Secession. Twenty years later the Relief and the Secession Churches came together on the voluntary principle as the United Presbyterian Church. From 1863 onwards a movement to amalgamate this larger body with the Free Church was started, and after long opposition on the part of Dr Begg and an anti-voluntary party, came to fruition, under the leadership of Dr Rainy, in 1900, in the United Free Church of Scotland. This transaction gave rise, indeed, to another secession on a small scale, and a protracted litigation to enforce the claim of the seceders to the property of the Free Church, which was partially recognised by the House of Lords, to which the case was appealed from the Court of Session. The " Wee Free " section, as it was popularly called, was, however, but an insignificant remnant, and did not materially affect the Union, though it gave rise to a revival of the old bitter spirit on a limited scale.

For twenty years previously a crusade in favour of the disestablishment of the Church of Scotland had been actively promoted by these churches, and for a time it looked as if disestablishment was a *sine qua non* of Presbyterian reunion on a national scale. Happily this disestablishment policy, which had tended to keep alive the rancour of Disruption times, ultimately gave place to a negotiation for a union on less radical lines towards the close of the second decade of the twentieth century on the basis of the national recognition of religion, the maintenance of the independence of the Church in things spiritual, and the retention of the endowments for its support. In virtue of the spirit of mutual conciliation, this union is in process of being realised, a series of articles having been drawn up and sanctioned by the Presbyteries and the Assembly of the Church of Scotland, and an application made to Parliament to empower the Church to enter into the Union on this basis.

A powerful influence in fostering the spirit of union has been the growing sense of the importance for the churches of social, compared with ecclesiastical, problems. In the presence of rampant social vice, industrial unrest, slum life, bad housing, the growing popular indifference or alienation, which such evils

tend to nurture, the Churches are learning to see ecclesiastical contentions in a truer perspective, and are more and more realising the paramount obligation of uniting their energies in the cause of social betterment. Their home missions have been too long influenced by the policy of strengthening rival ecclesiastical organisations by planting churches in the expanding cities or the growing industrial districts. The spirit of competition has multiplied these churches, with the result that in many cases the wealthier suburban districts of cities have been overchurched in the interest of ecclesiastical rivalry, whilst little progress has been made in evangelising the masses, and raising the standard of life and morality in the poor and slum districts. In these the churches are but sparsely attended, while the expedient of building mission halls for the poor has tended to beget in their minds the assumption that the Church is merely "the rich man's club," and has largely failed of its purpose. Despite the vast organisation of the religious life represented by the plethora of churches over the land, they have failed to grapple effectively with the evils of drunkenness and impurity, squalor, poverty, and crime, which still cast their dark shadow over the large centres of population. More effective work in this direction has probably been done by the Salvation Army and other popular organisations. A great deal is also being accomplished in the cause of social betterment by philanthropic agencies, which owe their existence and their activity to Christian teaching, if not directly connected with the Churches. Societies and institutions exist by the hundred for the benefit of the blind, the deaf and dumb, the inebriate, the orphan, the aged and infirm, etc., as the lists of the Charity Organisation Societies of Edinburgh and Glasgow, for instance, show. The Churches have their own organisations for dealing with social evils. To this end the Church of Scotland has introduced the office of deaconess and parish sister, and there have arisen social work committees, guilds, brotherhoods, in all the Churches. It would be unfair to ignore or belittle all this organised effort, directed and influenced by them. But the fact remains that it has mitigated rather than remedied the evils that fester in the body social, especially in the large cities. Mere church extension

by rival organisations has not brought the remedy, and church extension, which overchurches the residential districts of our cities and persists in wasting money and energy in maintaining four or even half-a-dozen denominational churches in thinly populated parishes or villages, where one or two would suffice, never will. In the pursuit of this policy the Churches have ignored too much the social mission of Christianity, and, partly at least, on this account they have lost their grip on the submerged masses. The fact is being increasingly recognised by social workers, both inside and outside the Churches. "Many," says the Rev. Dr Watson in his recent book on *Social Advance*, "hold aloof from the Church from the conviction that she has not done all she might have done for social amelioration; that she has acquiesced, and so helped to stereotype, their environment and those bad conditions under which they groan. That undoubtedly is a shortcoming for which the Church should now stand in sackcloth. She has not preached sufficiently the Gospel of the Kingdom. She has not applied Christian ethics to social, economic, and industrial conditions. She has emphasised charity more than justice." This conviction it is that has given a powerful impulse to the Union movement as well as to the application of new agencies and new methods of social work. It is becoming ever more apparent even to the ecclesiastical mind that it is only by co-operation and co-ordination of effort through a powerful national Church that these agencies and methods can be made more effective.

On the other hand, in their mission activity in the foreign field the Scottish Churches in the nineteenth century have had a splendid record. The rise of this wider missionary movement, which has resulted in the founding of Christian schools and colleges, and the establishment of native Churches in India, Africa, and China, dates from the beginning of the second quarter of the century. In 1796, when the first foreign mission societies were founded at Glasgow, Edinburgh, and other towns, Dr Erskine, the leader of the Evangelical Party, appealed to the General Assembly, New Testament in hand, to adopt an overture in favour of foreign missions. But the motion seemed too visionary to be taken seriously by the Moderate majority, and

was lost by 58 to 44 votes. About thirty years later a marked change had come over the Assembly's attitude to the subject in response to the more altruistic spirit of the age. In 1824 the proposal was reintroduced—on this occasion by the leader of the Moderate Party, Dr Inglis—and the Assembly now adopted it unanimously. Money was collected and a scheme drawn up, and in 1829 Dr Duff was sent forth to India to carry it out. The travels of Dr Livingstone gave a great impulse to the missionary spirit, and both the Church of Scotland and the Free Church extended their missionary enterprise to Africa and China with remarkable results. What Scottish missionary enterprise has accomplished, in addition to the mission activity of the Scottish Churches, may be best realised by the services rendered by Scotsmen to the cause in connection with the London Missionary Society. It was as agents of this Society that Dr Livingstone and Dr Moffat laboured in Africa, Dr Legge in China, Mr Milne in Malacca, and Chalmers in Papua.

A noteworthy improvement in Church architecture and public worship is also discernible throughout the second half of the nineteenth century. It has been an age of restoration and church building, in which the skill of ecclesiastical architects like Sir Rowand Anderson and Mr M'Gregor Chalmers has been applied with signal success. Too many of the great ancient edifices, like St Andrews Cathedral, are unfortunately past restoration. Some attempts, as in the case of the Holy Trinity at Dunfermline, made before the advent of a true æsthetic feeling, have been bad failures. Others have miscarried through fear of spoiling a picturesque ruin. In the case of the Chapel Royal at Holyrood, for instance, for whose restoration the late Earl of Melville and Leven left a large sum, which was applied instead to build a chapel for the Knights of the Thistle in St Giles. But in the case of St Mungo's, Glasgow; St Giles, Edinburgh; Iona, Dunblane, and Lerwick Cathedrals, and of parochial churches like St Michael's, Linlithgow, the architects have risen to the occasion. Other projects of this kind (in the case of St John's, Perth, for instance) are being matured. When the fabric has been entirely or largely preserved, the problem has been comparatively simple. It has largely been a matter of removing

the unsightly masonry and woodwork by which a large building like St Giles was divided into two or three churches after the Reformation.

With this revived interest in ecclesiastical architecture and art there has come an improvement in the conduct of worship. Organs and choirs and forms of service have successfully run the gauntlet of popular prejudice and love of the old ways. The Presbyterian service, when properly conducted, has a dignified simplicity, natural devotion, and an intellectual solidity which appeal to many accustomed to a more elaborate and formal ritual, and it is dear to the hearts of Scots folk who have grown old in its religious atmosphere. The late Queen Victoria, for example, prized it highly. But fondness for its traditional features is not necessarily incompatible with an appreciation of good music and a judicious use of devotional forms, and in this respect a widespread change of view has taken place in the course of the last half century. This change has been due, in the first place, to the innovating spirit of Dr Robert Lee about the middle of the century, and, in the second place, to the efforts of the Church Service Society to further the reform of worship. The Reformed Church of Scotland had from the outset possessed a simple liturgy in Knox's Book of Common Order, which was adopted by the General Assembly as a devotional guide to its members, though allowing liberty in the use of it. The long struggle between Presbytery and Prelacy which the arbitrary introduction of an alien Service Book into the Church of Scotland by Charles I and Laud had brought to a climax, had left a deep and not unnatural prejudice against the reading of officially imposed prayers. For introducing an order of public worship composed by himself into the service of Old Greyfriars in Edinburgh, the church so intimately associated with the Covenant of 1638, of which he was minister, Dr Lee was arraigned by the Presbytery, and enjoined by the General Assembly in 1859 to discontinue the innovation. Dr Lee forcibly, though vainly, argued that the Reformed Church had sanctioned and long used a liturgy, and had never formally disallowed its use. He not only disobeyed the Assembly's injunction, but introduced instrumental music into the services of his

church. For four years he was left unmolested, but the bitter feeling aroused by his persistence in flouting the injunction of the Assembly found vent in 1864 in a motion to proceed against him for contumacy. On this occasion, however, the more liberal-minded party in the Assembly carried its contention, that as no law had been violated, no offence had been committed, and that such innovations should only be suppressed in cases where they tended to disturb the harmony of congregations. The question occupied the attention of the Assembly in the following two years, and ultimately that of 1866 compromised the dispute by empowering Presbyteries to intervene in cases where such innovations were brought before them, and interdict them if found contrary to law, or tending to strife and division. At the same time it instructed the Presbytery of Edinburgh to re-open the Greyfriars case, which had been the cause of all the excitement, and proceedings were again instituted against Dr Lee. His sudden illness and death intervened before the renewed suit reached the Assembly, and the movement in favour of a moderate reform of worship, for which he had battled and suffered, and which the Church Service Society has carried on, may be said to have triumphed with his death. Among the reforms accomplished, it is questionable whether the introduction of a Hymnal can in all respects be accounted a serviceable addition to the Psalms and Paraphrases. Too many of these hymns are poor jingles of evangelical theology without elevation of thought or expression.

Noteworthy also is the growth in recent years of a more liberal spirit in theological discussion. What was popularly known in the Scottish Churches as "heresy-hunting," long an almost regularly recurring feature of Scottish ecclesiastical life, seems to be becoming a relic of the past. The reason is, not that Scotland has become more orthodox in the old sense of a strict adherence to traditional creeds and confessions, but that it has become more enlightened and more liberal-minded. What has contributed to this saner attitude in theological controversy is the fact that the sentences of the Church against heretics (so-called) have usually appeared to a later generation ill-advised and mistaken. The heresy of yesterday has tended to become the

accepted belief of to-day. In 1831, for instance, Mr Campbell, minister of Row, was arraigned and deposed by the Assembly for teaching the universal love of God for man, and the possibility of salvation for all. This was, of course, contrary to the Calvinistic doctrine of predestination and election, and the condemnation was almost unanimous, both Moderates, who in the previous century had favoured liberality of view, and Evangelicals, who had usually been keen to harry the heretic, uniting in casting out of the ministry one of its most estimable members. To-day the Calvinist Churches are teaching Mr Campbell's heresy, and modifying their confessions accordingly. The United Presbyterian Church drove from its ministry David M'Crae for questioning eternal punishment, and now the belief in hell fire seems to have become at least optional. Less than twenty years ago the Church of Scotland deposed Mr Robinson, the scholarly young minister of Kilmun, for the heresy of freely applying the higher criticism to the New Testament and publishing the results of his critical studies. It was an obscurantist attempt to limit the freedom of theological and historical research by a corporate body, many of whose members, by their lack of adequate expert knowledge, were incapable of judging the merits of the work of the courageous and conscientious young scholar. To seek to safeguard the faith by the repression of free critical enquiry is, however, being widely recognised as an untenable tactic which discourages scientific theological study, and renders ill service to the Church itself. A far more famous illustration of this short-sighted policy was afforded by the Free Church in its treatment of Dr Robertson Smith, the occupant of the chair of Hebrew in the Free Church College at Aberdeen. The young professor formulated and applied to the study of the Old Testament Scriptures in Scotland the historic critical method which seeks to discover their composition and authorship, and freely discusses their contents apart from any preconceived notion of an infallible mechanical revelation. For so doing he was arraigned before two Assemblies, on the ground that his teaching was subversive of faith in a divine revelation, and after a long and stirring struggle (1877-81) deprived of his chair, in spite of the strenuous support of a large minority.

The final sentence was a gross blunder, due in part to exigencies of ecclesiastical policy, in part to the conservative bigotry that would not look at historical and critical questions except through the medium of traditional prejudice. To-day, it is certain that no Robertson Smith case would be possible in the Assembly of the Church that condemned him nearly forty years ago. The scientific method in Biblical criticism and the liberal tendency in theology have been steadily advancing in the interval as the result, in part at least, of the pioneer work done in Scotland by Robertson Smith. The chairs of Biblical studies in the Universities and the Theological Colleges are now occupied by scholars more or less imbued by the scientific spirit of modern historic research. The same spirit is observable in the current attitude towards dogmatic theology, and its outcome has been a reaction from the metaphysical theology of the past in favour of a modification of creed and confession, and a relaxing of the terms of subscription to them. The emphasis has passed, or is passing, from the dogmatic accretion of Church tradition to the moral and spiritual verities of the Gospel itself. The change is not merely of vast benefit to Biblical and theological study; it is of the utmost value for the religious life. The problems and perplexities which the old theology had imposed on faith were becoming, in the face of the advance of modern knowledge, a serious stumbling block to many thoughtful men and women. To these theology could have no message and no spiritual inspiration unless by a change in its method and outlook.

The Scottish pulpit has been a great force in the religious life of the nineteenth century which produced a series of great preachers in Chalmers, Guthrie, MacLeod, and Caird—to mention only these more outstanding names.

The public career of Thomas Chalmers as preacher, professor, churchman, and social reformer, covered the greater part of the first half of the century. Born in 1780, he studied at St Andrews and Edinburgh Universities, where Mathematics, Science, and Political Economy engrossed his interest. He acted for a session as assistant to the professor of mathematics at St Andrews, and after his settlement, in 1803, as minister of Kilmany in Fife, conducted for a couple of sessions independent

classes in this subject and in chemistry. At this period he was a Moderate in religion, to whom the ministry was more a stepping stone to a university chair than a life vocation. He wrote articles for the *Edinburgh Encyclopædia*, and published *An Enquiry into the Extent and Stability of the National Resources.* A severe illness in 1810 and the reading of one of Wilberforce's books led to " a very great transition of sentiment," as he afterwards described this religious experience, which, several years before he left Kilmany for the Tron Church in Glasgow in 1815, transformed the Moderate into the Evangelical preacher and earnest pastor. During the eight years of his Glasgow ministry he attained the climax of his fame as a preacher of impassioned intensity and spacious eloquence, which, however, seems to a later age, laboured and turgid at times. His expansive oratory appealed to an age whose taste for a stately rhetoric was much keener than is the case to-day, and his power to draw and rivet vast audiences of all classes, especially on public occasions, was unequalled. His activity was by no means confined to the pulpit. He put himself in close touch with the teeming life of his parish, and laboured by means of a series of agencies to leaven it by a practical Christianity. He gathered around him a band of devoted parish workers. He organised Sunday and day schools for the education of the children. He attacked the problem of pauperism. He held strongly that the system of poor relief out of the rates was detrimental to the well-being of the people by sapping thrift and independence of character. He worked his parish on the principle of voluntary relief out of the Church collections, and by his organising talent made his scheme a success. He published a quarterly journal entitled *The Civic and Christian Economy of Large Towns*, in which he expounded and advocated his scheme. The scheme was, however, not widely adopted, and after his removal from Glasgow in 1823 to fill the chair of Moral Philosophy at St Andrews, it did not prove a permanent success even in his own parish. It was, nevertheless, a splendid tribute to his energy as a social reformer.

His removal to St Andrews withdrew him from his true sphere as preacher and parish minister into one where his eloquence was hardly in place, though the traditions of academic " eloquence,"

inherited from the previous century, still prevailed. Moral Philosophy had, however, an intimate relation to theology, and his lectures interested his students. Original or profound they could hardly be, inasmuch as he was no specialist in the subject, as he might have claimed to be in mathematics, and there is no evidence that he really attempted by special, independent study to become a master of it. At all events, he took the opportunity to abandon it on receiving the invitation to occupy the Chair of Divinity in Edinburgh University in 1827. As Professor of Divinity from 1828 to 1843 he interested and influenced a generation of students in an evangelical direction. But his reputation as a theologian has not outlived him, and theology has travelled a long way in advance since his day. His knowledge of even the advance of his own time was imperfect, and his tenure of the chair was distinguished rather by the inspiring effect of his personality on his students than by any appreciable contribution to the theme he expounded. He retained his interest in the question of pauperism, and lectured and wrote against the project of an increase in poor relief, which culminated in the Poor Law of 1844. He had taught Political Economy in connection with Moral Philosophy at St Andrews, and in two volumes on this subject, which he now published, he stressed the importance of applying its principles to secure the moral as well as the material welfare of the people. He adopted the Malthusian expedient of seeking to regulate the growth of population by discouraging early and improvident marriages, raising the standard of living, and postponing marriage till this standard had been attained.

From 1834 church extension claimed a large part of his energy, and in the succeeding six years over 200 churches were built at a cost of nearly £300,000, subscribed largely in response to his eloquent appeals throughout the country. This admirable practical activity was hampered by the great controversy which emerged out of the claim of the Church to veto the presentation by the patron of a parish of a minister unacceptable to a majority of the parishioners. The practical working of this claim brought the Church into collision with the Court of Session, to which aggrieved presentees appealed, and which upheld their right to

induction. To the Evangelical party, led by Chalmers, this appeared an unwarrantable encroachment by the State on the liberty of the Church, and when its Claim of Right was refused, he led this party out of the Church on the 18th May, 1843, to form the Free Church of Scotland. It was a daring, if heroic, step for a man who held so firmly the principle of establishment to take. The controversy, if somewhat intransigeant on both sides, had, however, a vitalising effect on the religious life of the country, though the rancorous spirit it engendered and maintained far too long was by no means an attractive spectacle from the higher religious standpoint.

Thomas Guthrie, who was born at Brechin in 1803, of which his father was a prosperous merchant and provost, was presented to the parish of Abirlot at the age of 27. He had been licensed five years earlier, and had spent part of the interval of waiting for a parish in renewing his studies at Edinburgh University, and continuing them for a session at the University of Paris. These post-licentiate studies were largely devoted to chemistry and medicine, for the Edinburgh Divinity Faculty had not inspired him with any special interest in theology. For some time before his presentation he acted as agent for the Dundee Union Bank at Brechin. As parish minister of the evangelical type, he threw himself with the utmost zeal into the work of social reform as well as preaching and visiting, establishing a parish lending library and a savings bank, besides a Sunday School. He took an active part on the evangelical side in the controversy in Presbytery and Synod over the veto act, and his reputation both as a debater and a preacher brought him in 1837 a call to the collegiate charge of New Greyfriars, Edinburgh, on the understanding that an additional church, that of St John's, was to be erected, of which he should be the sole minister. This church was opened three years later, and his gifts as a popular preacher filled it from the outset. It was situated in close proximity to the Cowgate and Grassmarket—the worst of Edinburgh slums. Guthrie was keenly interested in the evangelisation of the masses, and here was a sphere that called for all the ardour born of a zeal for the Gospel and a deep sympathy with human misery. Crime, drunkenness, poverty, and squalor had their

abode among its wretched denizens. He relinquished his church at the Disruption, in which he took a leading part, but he remained within the district as minister of Free St John's, which was opened in 1845. His eloquence filled it to overflowing, and kept it full. It was of that popular type which pictures, and appeals, and persuades. He had a vivid imagination, though not a profound intellect, and he possessed in a marked degree the gift of illustrating from nature and life the evangelical message, which he set forth with arresting pathos and power. It speaks much for the high standard of his magnetic oratory that it was popular in the sense of attracting all classes. But his influence was far more than that of the popular preacher. He threw himself into the task of grappling with the social evils of the slum parish in which he worked. As a social reformer and philanthropist, he erected a splendid monument to himself in the Ragged Schools which he initiated in Edinburgh, and contributed to found throughout the United Kingdom. He saw that in order to make headway against the evil influences of slum life, he must try to rescue the children, to educate them mentally, morally, and industrially, and thus give them a chance to rise above the degradation of home and environment. The object of the association which, with the aid of a strong committee of his fellow citizens, he founded in 1847, was to afford such children a daily allowance of food, to instruct them in the three R's and the Scriptures, and to teach them a trade. Dissension, unfortunately, ere long arose in the committee over the question of religious instruction, the association being undenominational, and a split in the movement occurred. The dissentients formed the "United Industrial Schools" in distinction from the "Original Ragged Schools," as Dr Guthrie's were called. Though the adoption of the title "Industrial" was preferable to the objectionable term "Ragged," the split was unfortunate. But the controversy tended to advertise the movement, which was extended, largely by Dr Guthrie's exertions through the Press and on the platform, not only in Scotland, but in England. He strove to obtain the assistance of a Government grant on the ground that the schools were rendering important national service. As the mouthpiece of a deputation to Lord Lansdowne,

President of the Privy Council, he showed that whilst each criminal cost the country on an average £300, the cost of rescuing a boy from the slums and preventing him from falling into crime, clothing, feeding, and training him, and thus making him a useful member of society, was only £25. A Parliamentary Commission reported in favour of the scheme, and in consequence of the passing of two acts dealing with criminal and vagrant children respectively, the Privy Council in 1856 gave a capitation grant of 50s. a year for every child being trained in a certified Industrial School, whether the child was committed by a magistrate or not. Unfortunately, in the following year the grant was reduced to 5s., and by the Industrial Schools Act of 1861, the grant, though raised in amount, was limited to committed children. Dr Guthrie sought to counter this backward step by agitating the question and appealing to the public, with substantial effect, for funds, and in 1866 a new Act, by giving the magistrates power to commit destitute as well as criminal children to these schools, greatly increased the amount of State aid received by them.

Drunkenness, he found by experience, to lie at the root of much of the crime and destitution which he thus practically laboured to remedy, and he sought to provide an additional counteraction in the temperance and total abstinence movement, of which he was one of the early advocates. He was a member of the "Scottish Association for the Suppression of Drunkenness," founded in 1850, which did so much to secure the passing of the Forbes Mackenzie Act. One of his most effective contributions to the movement was a series of sermons on intemperance, afterwards published under the title of *The City—Its Sins and Sorrows*.

Norman MacLeod, who was born in the manse of Campbeltown, of which his father was minister, went through Glasgow University between 1827 and 1831 without acquiring any learning worth speaking of. Under Chalmers in the Divinity Hall at Edinburgh, from 1831 to 1834, he felt the inspiration of the teacher. Thereafter he spent a year at Weimar as tutor to a young Englishman, and returned to study at Glasgow University before he was ordained to the parish of Loudoun in 1838. He

was at this period an evangelical of the school of Chalmers, but without the zealous ecclesiastical temper that waxed hot over the contentions of the day. He was conscientiously opposed to the extreme course of disrupting the Church, rather than uniting inside it for the reformation of what was amiss by the education and pressure of public opinion. He remained in the old Zion, though he actively sympathised with the policy of redressing the evil of patronage by securing, in a legal way, for the people the right to choose their minister. He felt that the Gospel consisted in something higher than war to the death between brethren over ecclesiastical polity, and of this Gospel he was an enthusiastic preacher at Dalkeith after Loudoun, in the Barony Church, Glasgow, after Dalkeith, rendering the while great practical service in the rebuilding of the shattered Establishment. Of sympathy with humanity he had an overflowing fund. Genial and big-hearted, he was in his element in every class of society. The magnetic humanity of the man crowded his church, and set in motion a band of devoted workers to evangelise his huge parish through Sunday schools, day schools and evening classes, savings banks, and refreshment rooms in competition with the public-house. He talked in the pulpit in direct fashion, with nothing of the studied orator, and little of the laborious thinker. He grew more liberal with the years, and horrified the precisians by his unconventional way of looking at men, things, and even creeds—the most jovial of companions, showing a rare gusto for life, tentatively humanising the Sabbath, and even proposing in the General Assembly to abolish tests for theological professors. He made his influence felt in the Broad Church movement for the reform of worship and greater freedom of theological thought, which owed much to the initiation of Dr Robert Lee and Principal Tulloch. He had by this time outlived the old narrow Evangelicalism. He made an outspoken plea before the Presbytery of Glasgow for a freer Sunday, which raised an awful outcry among " the unco guid " throughout the land, for which he was in danger of deposition. He survived this distinction, and was instead deputed to visit India in 1867 in the interest of missions. The expedition overtaxed his strength, of which he had hitherto been all too prodigal. He had only five years

more to live, and his death in 1872 was a national sorrow. *Good Works*, the periodical which he edited, and the novels of a quasi-religious character which he wrote, made him popularly known throughout the land, and from the Queen, whose favourite Scottish chaplain he was, to the peasant and the artisan, to whom he was familiarly known as "Norman," his loss was that of a friend as well as a spiritual guide.

John Caird, after a distinguished career as a student at Glasgow University, became in 1845 minister of Newtown-on-Ayr, when he was transferred to Lady Yester's Church, Edinburgh, eighteen months later. He at once took a foremost place among the preachers of the day, and attracted overflowing audiences, including a large number of students, to the unostentatious church near the University. "Without manuscript or note before him," says the late Dr Macmillan of Greenock, one of his student hearers, "the preacher began by laying out his subject in a manner so distinct and methodical that every one present could grasp it as a whole; and then proceeded to unfold and illustrate it with wonderful freshness and power. Carefully composed and committed to memory as was his theme, he spoke, as if with pure spontaneity, the thoughts that arose within him at the moment. Profoundly impressed himself, his words rang out strong and fervent, emphasised by the most appropriate gestures. Standing back from the pulpit board, brushing his long hair from his forehead, his eye kindling with a dusky yet piercing light, 'orb within orb,' he poured forth a succession of impassioned sentences which fairly carried you away. There was no pretence, no studied unnatural effect, but the fire and rapture of native eloquence. . . . His sermons, which reached from the first, and uniformly maintained, a high level—far above the average—were more religious than theological, more practical than devotional. They were distinguished for their philosophic breadth, and their intense sympathy with all the struggles and sorrows and sins of humanity. They ranged over a wide and varied field of subjects. Starting from the familiar evangelical truth, they touched all the experiences of ordinary life, and brought the Gospel into harmonious relation with all that is beautiful in art, and ennobling in philosophy and history."

He left Edinburgh for the parish of Errol in Perthshire, where he spent the next eight years, devoting himself to study as well as to the work of his parish, which included the founding of a school of domestic economy for the training of girls. Student as he was by disposition, he had an open eye for common life and an intense sympathy with human kind, and his striving to bring religion to bear on practical life found magnificent expression in the famous sermon on *Religion in Common Life*, preached before the Queen at Balmoral in 1855, which, in published form, carried his fame over the length and breadth of Britain. The result was his translation to the Park Church, Glasgow, in 1857. In the Park pulpit the effect of the years of reading and reflection spent in the manse of Errol appeared in the more profound treatment of the subject matter, and the more restrained tone of its presentation. His was the progressive type of mind which learns from experience, and works its way through revision of old beliefs to new convictions. He had studied German at Errol, and had taken a sympathetic interest in developments in theology, and the thought of these sermons was fresher and more independent, if less " sound " from the orthodox point of view. " A certain change," says the late Principal Story, " had meanwhile passed on him. The old charm and power were there, but the tremendous oratorical force was restrained. The sermons were read. To the thoughtful hearer they were, no doubt, better worth hearing. They were, as of old, eloquent, but the eloquence was less exuberant, and the substance and the theological tone of the preaching were different from the earlier type."

The ability as well as the power of these Park sermons pointed him out as the fitting occupant of the Chair of Divinity in Glasgow University, to which he was unanimously appointed by the University Court towards the close of 1862. In him the students found a guide who was responsive to the new currents of thought in philosophy and theology, and was not content, as the Divinity professors had usually hitherto been, to expound to them the confessional doctrine in the conventional manner. He was suspect of heresy in " religious circles." He had his own views, as every serious thinker and teacher is entitled to have. But

no one had a more profound belief in the superiority of Christianity as a creed and a life, provided the creed is a living one and not a mere echo of the conceptions of the past. He held the chair ten years, until he became principal in 1873. As a professor he interested and stimulated his students because he made a fresh start in its interpretation, and thus contributed to the advance made in Scotland in theological thought during the last fifty years—an advance represented in the Free Church by men like Bruce and Denny. Personally, he was the most attractive of men—sympathetic, whole-hearted, simple, and winning; one whom to know was to love as well as admire. There was only one man in the Church of Scotland in the second half of the nineteenth century who could be compared with him in spirit and thought—the late beloved Robert Flint—his superior in the wide sweep of his learning, though less gifted as a pulpit orator; his peer in simplicity and sterling worth of character, and in his inspiration as a teacher.

15. Poor Relief

By the beginning of the nineteenth century the right of assessment for the relief of the poor, which the Act of 1579 had conferred on magistrates in burghs and justices in rural parishes—later transferred to heritors and kirk sessions—was exercised in less than 100 parishes. Relief was given from voluntary church contributions and begging, within certain limitations, was widely recognised as a legitimate means of supplementing these doles. Unlike in England, assessment was the exception, not the rule in Scotland, and the professional beggar was a characteristic figure of social life. The voluntary system which encouraged this state of things was far from ideal. It did not provide adequately for the incapable poor, or for what were termed the "occasional poor," who through lack of employment were, especially in times of distress, unable, though willing, to maintain themselves. For the latter, in fact, there was no legal obligation at all to provide relief. It tended to perpetuate a low standard of life in the begging class, to put a premium on squalor, immorality, and

crime. It might be made a success in the hands of a Chalmers, though, as we have noted, it was not a permanent one even in his own parish. It was a palliative rather than a remedy, and the tendency in the first half of the nineteenth century was to substitute for it in an ever increasing number of parishes a compulsory assessment. In 1817 the number of such parishes had risen to 152, in 1839 to 236, the total amount of the assessment being £77,000 odds, whilst the number of persons in receipt of relief, both assessed and voluntary, was 79,429, or about three per cent. of the population. The steady growth of population during this period, the increase in the number of dissenters, who were disqualified from relief from the State Church collections, and the all too frequent distress of the industrial classes resulting from the recurring industrial and commercial depression, forced upon the Government the question of a revision of the Scottish Poor Law, under which heritors and kirk sessions were not legally bound to provide for the relief of able-bodied persons in distress, though they might afford such relief at their own discretion. It was, however, but rarely exercised in favour of such applicants. The Commission found that the funds raised for poor-relief and the amount of relief afforded were in many parishes insufficient. It did not, however, go the length of recommending compulsory assessment in those parishes in which it was not in practice, being evidently reluctant to interfere with use and wont. But it advised the establishment of a Board of Supervision at Edinburgh, to which all parochial authorities should be bound to report the numbers and condition of the poor, and the amount of relief given in each parish, and which should have the power to receive complaints and the right of investigation and remonstrance. For the purpose of making these reports and conducting the correspondence with the Board, the authorities of each parish should appoint a salaried clerk. In assessed parishes the ratepayers should receive representation on the parish board, in addition to the heritors and kirk sessions. In burghs containing several parishes, it recommended their union for the purpose of poor-relief under a body of managers elected by the ratepayers. It recommended, but did not render compulsory, the establishment of poorhouses in every parish, or

union of parishes containing 6000 or 8000 inhabitants, whilst advising the continuance of outdoor relief in cases in which the recipients could be properly cared for. It dealt with the provision of medical relief to the poor, the improved treatment of the insane poor, the maintenance and the education of illegitimate pauper children, the abuse of issuing passes to stranger paupers to enable them to obtain subsistence in the parishes through which they might pass on their way homeward, which encouraged imposition and vagrancy. On the question of applying funds raised by assessment to the relief of the able-bodied poor in times of depression, it decided that this was " neither necessary nor expedient." Finally, it deplored the prevalence of mendicity, and emphasised the necessity of dealing more effectively with this demoralising evil.

These recommendations were embodied in the Act of 1845 for the amendment and better administration of the poor laws in Scotland. As far as it provided an organised machinery in the Board of General Supervision and the elected Parochial Boards, the Act was a distinct advance on the old system. The powers of the Board of Supervision were, however, too limited, and the lack of compulsory assessment for all parishes as well as the limitation of relief to the aged and infirm poor seemed to err on the side of caution. The necessity of a compulsory assessment for the proper working of the Act tended, however, to accelerate the remedy of this defect, and at the end of the first year of its operation the number of assessed parishes had risen to about 450, or more than one-half of the total number in the country. At the end of the second the number had risen to 558, in 1853 to 680, and by 1884 to 827. In 1892 the number of unassessed parishes had fallen to 49, and in 1911 to 4. In 1847 the expenditure for relief and management was £433,915; in 1887 it had risen to £899,135; in 1917 to £1,567,621. In 1884 the number of poorhouses was 64. Whilst the expense of relief has thus tended to rise, the number of paupers, exclusive of dependents, has tended to decrease. From 77,759 in 1871 it fell to about 60,000 in 1891. In 1917 the number was about the same. The average between 1871 and 1917 is, however, from 60,000 to 70,000, and in 1909 it rose as high as 76,428—the highest since

1871. During the war years there was a marked decrease, due to the exigencies of military service and the abundance of employment—the number falling from 66,000 odds in 1914 to 57,000 odds in 1918.

The Act of 1845 was modified by the Local Government Act of 1894, which superseded the Parochial Boards by the Parish Councils, and the Board of Supervision by the Local Government Board. The Parish Council is elected every three years, and the basis of its administration is still the Act of 1845, with certain modifications in detail. The provision that no able-bodied person, though destitute and unable to find employment, is entitled to relief, still holds. The Old Age Pension Acts (1908 and 1911), by granting a small weekly allowance, recently increased owing to the increased cost of living, has tended, in some measure, to remedy this defect in the case of those whose age renders it difficult or impossible to maintain themselves by their labour. The establishment of Labour Exchanges (1909) to facilitate employment, the Employers' Liability Act (1880), the Workmen's Compensation Act (1906), and the National Insurance Acts against sickness and unemployment (1911-1914), the out of work donation and the superannuation allowance of the Trade Unions have materially contributed to mitigate the destitution resulting from lack of work. The problem cannot, however, be regarded as having attained an adequate solution in virtue of these mitigations, and the demand is being raised for more systematic and adequate State support for the unemployed worker. The Unemployment Insurance Act of 1920 is, in part, the outcome of pressure in this direction. Another sign of dissatisfaction was the appointment of a Royal Commission to investigate once more the working of the Poor Laws and the Relief of Distress. The Commission, which reported in 1909, was unable to come to an unanimous decision. The majority recommended the maintenance of the present system, with modifications intended to remedy what they considered its defects. The minority, on the other hand, advocated its abandonment, and the transference of its powers and functions to other authorities—the care of children to the Education Department, of the sick to the Health Authorities, of the aged to Old Age Com-

mittees, etc. In view of this discrepancy, the Government took no special action on their findings, preferring to await the effect of the Old Age Pensions Act, and other relative legislation on pauperism and its incidental evils.

The most effective remedy is to seek to eradicate rather than ameliorate poverty—to attack its causes in order to forestall its effects. The dictum of Dr Chalmers still holds, after all the legislative effort to uproot the evil. "If you wish to combat poverty, combat it in its first elements. If you confine your beneficence to the relief of actual poverty, you do nothing. Dry up, if possible, the springs of poverty, for every attempt to intercept the running stream has totally failed." To do this effectively there must come a change in the present industrial system in the direction of more systematic technical education, and of the principle of co-operation, co-partnership, which would lead not only to greater efficiency and greater production, but to the elimination of the hand-to-mouth system on which too many of the workers are doomed to labour and live. This method is less risky and less problematic than the full-fledged nationalisation of industry, which is the Socialist panacea, but which would involve a financial and social revolution which no war-exhausted country is likely to face, in this generation at least.

However much controversy there may be on the method of dealing with poverty, there is general agreement that prevention, rather than relief, is the only effective remdy. Mere charity, whilst no doubt serviceable if discriminately given, is a system objectionable economically and morally. It tends in far too many cases to sap self-respect and the will to work. Work, not charity, is what the self-respecting and able-bodied man or woman claims, and rightly claims. Every citizen who has fitted himself or herself for a legitimate occupation ought to have the opportunity of earning a living by this occupation, and not be left to the tender mercies of supply and demand. No industrial system, taking the word industrial in the widest sense of all work necessary for the maintenance of a complex society, can be deemed satisfactory which does not tend to serve this end, and mere charity, however well organised, can be no substitute for this social obligation. There are over two million people in the

United Kingdom in receipt of poor-relief, costing the nation between 16 and 17 million pounds annually. In Scotland the amount is well over 1½ millions. About another 10 millions are devoted to the same object by public and private charity. In Edinburgh alone the sum distributed in charity is nearly £300,000, whilst the sum derived from the poor rate is £95,000. In the United Kingdom there are ordinarily between three and four million people on the verge of destitution. Fully three times this number are estimated to be near, if not below "the poverty line." There is surely something very much at fault with an industrial system that makes this state of things possible, even making allowance for such factors as improvidence and incompetence.

The workhouse system of relief is also now generally condemned. "These institutions," in the judgment of the Royal Commission of 1909, "have a depressing, degrading, and positively injurious effect on the character of all classes of their inmates, tending to unfit them for a life of respectable and independent citizenship. Life in the workhouse does not build character up, it breaks down what little independence and alertness of mind is left. It is too good for the bad, and too bad for the good."

16. Municipal Enterprise and Social Progress

At the beginning of the nineteenth century the Scottish Town Councils were close Corporations, whose members chose the new councillors in place of those retiring by rotation. Only if the elections proved to be invalid were the burgesses entitled to exercise this right, subject to a warrant from the Crown sanctioning their meeting for this purpose. In 1817 the burgesses of Montrose elected their council in virtue of this right, and of the warrant of the Crown sanctioning the poll. This was the beginning of a movement on behalf of municipal reform, which went hand in hand with that for parliamentary reform. The need for such reform was accentuated by the bankruptcy of the Aberdeen Town Council in 1817, as the result of scandalous mismanage-

ment and corruption. Nearly half of the Royal Burghs themselves voted resolutions in its favour. The question was agitated in Parliament by the Whigs, and pressed on the Government by Lord Archibald Hamilton. The case for reform was urgent enough, the Town Councils being practically responsible only to themselves. There was no effective outside control over the spending of the public money, which seems to have been of a haphazard, in some cases, even a corrupt, character, whilst the sanitary conditions were very primitive, and the police supervision very inefficient. It was not till 1812-13 that the Edinburgh Police Commissioners, for instance, who were created by the Police Act of 1805, first undertook the scavenging of the city, and though there must have been some method of cleansing the streets, which were formerly used as common sewers, there is no record before this date of public expenditure for this purpose. Glasgow seems to have been equally backward. "It was not till the passing of the Police Act of 1800 that the removal of refuse and the sweeping of the streets was looked upon as a public duty. The cleansing of the city was added to the duties of the master of police or chief constable. No separate staff was set aside for the work, however, the night watchmen or policemen being entrusted with the cleansing as well as the watching of the streets of the city. Their first attempt in the way of cleansing was to devote two hours twice a week to the sweeping of the street." It was not till 1815 that a separate cleansing staff existed.

The demand for municipal reform encountered the strenuous opposition of the Tories, who realised that municipal was a step in the direction of parliamentary reform. It came at last as the logical sequence of the Reform Bill of 1832, in the Scottish Municipal Reform Act of 1833, which empowered the qualified burgesses (the municipal franchise being the same as the parliamentary) to elect the Town Councils of the burghs. The Act was the initial condition of the improved and increasingly complicate municipal administration of the nineteenth century. It was the forerunner of many others enlarging the powers of the municipal authority and the scope of its activity, such as the series of Burgh Police Acts (whether local or general), Improve-

ment Acts, Acts bearing on the water supply, public health, housing, town planning, etc. In the counties the administration up to 1889, when it was transferred to elected County Councils, was in the hands of Commissioners of Supply and the Parochial Boards.

Improvements in sanitation and housing in burghs were at first entrusted by local Police Acts to local bodies of Police Commissioners, and not to the Town Councils. It was not till 1833 that the first general Burgh Police Act was passed, and not till 1900 that the Police Commissioners were generally merged in the Town Councils, though in the case of a number of towns this union had taken place earlier. The Act of 1833 was amended and supplemented by others, notably that of 1862, which made provision for lighting, cleansing, paving, draining, water supply, and public health in burghs, and for the appointment of an officer of health to deal with the causes and prevention of disease within the burgh area. Five years later the Public Health Act (1867) established the Board of Supervision as the central authority for administering the Act, and placed the responsibility for its local application on the local authority—the Town Council or the Police Commissioners. It empowered the appointment of a sanitary inspector or inspectors, and a medical officer or officers for carrying out the purposes of the Act. Thirty years later it was replaced by the more comprehensive Public Health Act of 1897, which made it obligatory on the authority to appoint health and sanitary officials.

In consequence of the application of this complicated legislation, the history of the Scottish burghs since 1833 has been one of expanding municipal enterprise and social advance. We can only attempt to illustrate this advance by some characteristic data in the case of the larger cities, particularly of Edinburgh and Glasgow, which afford an object lesson on the largest scale in municipal social enterprise. Large schemes, for instance, have been carried out for improving the water supply, housing, and public health of these cities. Up to the sixties the water supply of Edinburgh was in the hands of a Water Company, whose concern was rather the interests of its shareholders than the needs of the citizens. After a great deal of contention, the Town Council

in 1869 bought out the Company at a cost of considerably over half a million, and established the Edinburgh and District Water Trust, consisting of members of the Councils of Edinburgh and Leith. In 1874 the Trustees promoted a scheme for increasing the supply by bringing water from the Moorfoot Hills to the city, which raised the available supply by nearly 9 million gallons per day, the capital expenditure being about £400,000. Twenty years later the growth of the population necessitated another addition, and this was ultimately provided in the Talla Water Scheme which, at a cost of about £1,000,000, gave a further supply from the Tweedsmuir region of 10 million gallons per day, raising the amount to 45 gallons a day per head of the population. The expenditure on the waterworks from 1869 to 1919 amounted to a total of £2,882,683. In 1855 the Glasgow Town Council acquired the works of the Glasgow and the Gorbals Water Companies, and obtained powers to draw a supply from Loch Katrine, 34½ miles distant. For this purpose the level of the loch was raised four feet, and an aqueduct, capable of carrying 40 million gallons per day, constructed to a reservoir at Milngavie. Thirty years later another Act empowered the Corporation to raise the level by five additional feet, to raise that of Loch Arklet by twenty-five feet, and carry the water from this loch by a tunnel to Loch Katrine, and to lay a second aqueduct to the reservoir at Milngavie capable of carrying 70 million gallons per day. Adding the supply from the Gorbals Works, which is derived from the White Cart, and yields about 4½ millions per day, the city thus commands a daily supply of 114½ millions, besides another 2½ millions from the Clyde Supply Works for commercial purposes. The total capital expenditure on these works amounted to nearly four million pounds. Subsequent expenditure has increased the amount to nearly five millions. In 1915 the Corporation purchased the land in Glenfinlas with a view to ultimately diverting the water of the river Turk by tunnel to Loch Katrine, so as to yield a further daily supply of 14½ million gallons. A Provisional Order of 1919 empowered it to raise the level of the loch by an additional five feet, and thus proportionately increase the supply. In addition to acquiring the Loch Katrine water supply,

it recently purchased the watershed area north and south of the loch, extending to 24,000 acres, at a cost of about £72,000.

As in the case of the water supply, the gas lighting of the larger burghs was originally a private concern. Since 1888 in Edinburgh and 1869 in Glasgow, it became a municipal enterprise. In the former year the Corporations of Edinburgh and Leith purchased the works of the two local Gas Companies, and placed their management in the hands of a joint Gas Commission. About twenty years ago the Commission obtained authority to construct extensive new works at Granton, which were completed in 1903. The removal of the Edinburgh works from the site in New Street, east of the Waverley Station, at the same time, did away with what was an ugly defacement of one of the finest prospects in the city. Glasgow possesses three works in addition to the two originally acquired by the Corporation—the latest and most extensive being situated at Provan, and capable of producing 16 million cubic feet per day. Exclusive of the Provan works, which are expected to be completed in 1921 at a cost of half a million, the total capital expenditure up to the year 1900 was close on 2½ millions, and has now risen to double this figure. The quantity of coals used per annum was 666,769 tons, the number of men employed 3121, and the revenue—in part contributed by the sale of coke, tar, and other by-products —£770,000. In 1920 it had risen to nearly double this sum. Towards the end of the nineteenth century electricity began to supplement, and now bids fair to supersede gas for both public and private lighting in the large cities. Glasgow Corporation led the way by obtaining an Electric Lighting Act in 1890. Edinburgh followed a year later, and in 1895 completed the power station at Dewar Place, to which some years later the M'Donald Road station was added. The total expenditure on these undertakings up to 1920, including a projected station at Portobello which has not yet been completed, amounted to £1,318,629, and the annual revenue, which was only £16,322 in 1896, had risen to £142,735 in 1914. Electric lighting was first supplied in Glasgow by a private company in 1879 for St Enoch Station, and soon afterwards by another company for the Queen Street Station, and in 1884 by a third company for the Glasgow General

Post Office—the first in the United Kingdom to be so lighted. In February, 1893, some of the main streets were electrically lighted for the first time from the Waterloo Street Generating Station of the Corporation, and the demand became so great that it was found necessary in 1897 to erect two new works—one, extending to 4½ acres, at Port Dundas, the other, covering about two acres, in Pollokshaws Road. Another indication of the rapid extension of the undertaking is the rise of the number of consumers from 108 in 1893 to over 4000 in 1901, and of the revenue from nearly £7000 to nearly £80,000, whilst the total capital expenditure verged on a million. In 1920 an additional station was opened at Dalmarnock at a total cost of over two millions. The number of consumers had risen to 45,000, the revenue to nearly one million, and the capital expenditure to nearly 4½ millions.

Communication within the larger burghs was greatly facilitated by the introduction of street tramways, the running of which was at first leased to private companies. The first tramway in Glasgow was opened in 1872, and in 1876 thirty-one miles of single track lines had been completed. In 1894, when the Corporation took over the undertaking, the length of the lines had increased to eighty miles. By the Corporation Act of 1899 powers were taken to extend the system to Paisley, Cathcart, Rutherglen, Tollcross, and Shettleston, and subsequently it was carried to Bishopbriggs, Clydebank, Renfrew, and Cambuslang, raising the total length to 137 miles. In 1898 overhead electric was substituted, as an experiment, for horse traction on the Springburn route, and the experiment was so satisfactory that it was decided to adopt it for the whole system. To this end a high tension generating station—the largest of its kind in Europe—was erected at Pinkston, with five sub-stations at the existing horse-car depots. The total length of single track is now 198¼ miles, the total capital expenditure nearly 4 millions, and the gross revenue reached nearly 1¾ millions in 1920.

In Edinburgh a company obtained power to construct tramways in 1871, and the system, which was subsequently extended, was opened for traffic two years later. A second company was authorised to lay down cable tramways in the northern district

of the city, where the steep gradients rendered horse traction impossible. Both systems were acquired by the Corporation, the former in 1892, the latter in 1898. Whilst other large burghs decided to discard horse for electric traction, the Edinburgh Corporation preferred for reasons of amenity and cheaper maintenance to adopt the antiquated cable system, at the same time leasing the service to a company. The total expenditure (including the purchase of the original undertakings) on this reconstruction amounted, up to 1920, to fully £1,600,000. The system has proved unsatisfactory, and the breakdown of the Edinburgh cable cars has been in recent years a chronic occurrence. The inefficiency of the system has, in fact, become a byword of reproach to the city, and the Corporation recently took over its working with a view to its ultimate conversion, meanwhile substituting motor 'buses on certain parts of it. Motor traction by private company is also available on the main routes from the Capital to the towns and villages in the more immediate neighbourhood.

Sanitation and cleansing, which are closely related, are among the most important of modern municipal enterprises. Under the Burgh Police Acts, the Public Health Acts, the Housing Acts, and, directly or indirectly, many others, the Town Councils are invested with wide powers relative to the erection of buildings, drainage, sanitary conveniences, cleansing, insanitary houses and areas, etc. Five of them—Edinburgh, Glasgow, Dundee, Aberdeen, Greenock—have special police acts regulating these matters. The Dean of Guild Court, consisting of the Dean and two other Councillors, has jurisdiction over the construction of new buildings and the alteration of existing buildings and streets. Other important officials unler this legislation are the Medical Officer, the Sanitary Inspector, the Inspector of Cleansing and Lighting, the Burgh Engineer, the Master of Works. In a large city like Glasgow a number of subordinate officials—assistant medical officers and inspectors of various kinds—is necessary to carry out the work of these departments. The chief medical officer and the chief sanitary inspector are responsible for that of the sanitary department, which has a central staff of 75, and a divisional, which works the five administrative areas of the city,

of 181. This department deals with the detection and prevention of epidemic disease, for which special hospitals are provided, the testing of drains, the sanitary condition of common lodging-houses, of the houses of the poor, workshops, and common stairs, the fumigation of infected buildings and infected articles, overcrowding, the inspection of shops, dairies, markets, slaughter houses, the detection of adulterated food and drugs, the provision of public baths and wash-houses, the supervision of children's playgrounds, etc. The Cleansing Department is concerned with the scavenging of streets, closes, and courts, and the removal and disposal of all refuse. The sweeping of the streets is done at night by horse machines introduced at Glasgow in 1870, and motor driven machines, and during the day by hand sweeping, the refuse in the principal thoroughfares being lodged in iron bins, sunk at intervals in the pavement. This refuse, along with that collected from shops and dwellings, is removed daily to the dispatch stations. The street sweepings are emptied into trucks owned by the Corporation and dispatched to the country to be utilised as manure. Domestic and shop refuse, after treatment, is also utilised for this purpose, whilst the rubbish is consumed in destructor furnaces, and the clinker, or furnace ash, is sold as material for making concrete. The revenue derived from manure and various kinds of refuse amounted in 1919 to over £21,000. The Glasgow Corporation, besides supplying farmers over a radius of fifteen counties, uses a large proportion of the city refuse for fertilising its own farms, extending to about 1,500 acres. This method of disposing of this material, which aggregates nearly 450,000 tons per annum, is a vast improvement on the old system obtaining up to the " eighties " of last century, of carting it to open depots within the city boundaries, where its accumulation formed a grave sanitary danger. The total cost of cleansing the city, after deduction of revenue, is £262,000.

The Cleansing Department of Edinburgh employs a staff of nearly 600. In several " tooms " in the country it disposed of over 100,000 tons of refuse in 1919, including about 4,000 tons of manure to farmers and allotment holders. The salvable refuse, such as waste paper, rags, etc., was sold for about £6,500. The

expenditure of the department in the same year amounted to about £95,000.

Closely connected with the sanitary improvement of the large towns is the problem of dealing with slum property. The problem has engaged the attention of the municipal authorities during the last fifty years, and improvement schemes, more or less extensive, have been initiated with the object of lessening, if not eradicating this blot on urban life. All the large Scottish cities, and even some of the smaller ones, like Perth and Inverness, have undergone a transformation in this respect by the reconstruction, in part at least, of slum districts. Edinburgh took action immediately after the passing of the Public Health Act of 1867 when its first improvement scheme—that of Lord Provost Chambers—was put in operation. The net cost of this scheme was £285,621. Under the Housing of the working Classes Acts of 1890 and 1909 further improvements were carried out at a cost of £215,198, whilst under the Housing and Town Planning Act of 1919 an additional £92,291 had been expended up till May 1920—in all nearly £600,000. Another notable improvement has been the purification of the Water of Leith—the stream of this name running through Edinburgh and Leith—which was carried through by a Commission under the Acts of 1889 and 1893 at a cost of £275,945. This undertaking consists of a trunk sewer, commencing at Malleny in the County of Midlothian, traversing the valley of the stream, and falling into the sea at Seafield, a distance of about 12 miles. It receives the discharges of numerous contributing sewers in Edinburgh and Leith, and from the industrial works in the valley.

Glasgow again affords an object lesson on the largest scale. It was, in fact, the pioneer of the slum improvement movement in the United Kingdom, its City Improvements Act having provided Lord Cross with the model for his Improved Dwellings Act. The Glasgow Act, which called into being the City Improvements Trust of the Corporation, was obtained in 1866. Its objects were expressed in the preamble, which states that " various portions of the city of Glasgow are so built and the buildings thereon are so densely inhabited as to be highly injurious to the moral and physical welfare of the inhabitants, and many of the

thoroughfares are narrow, circuitous, and inconvenient, and it would be of public and local advantage if various houses and buildings were taken down, and those portions of the said city reconstituted, and new streets were constructed in and through various parts of said city, and several of the existing streets altered and widened and diverted, and that in connection with the reconstitution of those portions of the city provision was made for dwellings for the labouring classes who may be displaced in consequence thereof." The congested and highly insanitary " portions " included in the Act consisted mainly of the Gallowgate, High Street, Trongate, and Saltmarket, and covered about 90 acres. The Act empowered the Corporation to construct new and alter existing streets in this area, to purchase the ground, to demolish old and erect new buildings for the poorer classes, and sell or lease it for this purpose, to borrow $1\frac{1}{4}$ millions, increased by the Act of 1880 to $1\frac{1}{2}$ millions, and levy an assessment on occupiers for carrying the scheme into operation. The Corporation proceeded with the work of clearing away dilapidated and insanitary buildings and forming new and altering existing streets. Whilst erecting two model tenements and several model lodging-houses in place of the wretched private lodging-houses that abounded in the locality, it preferred to sell the ground and leave the construction of dwelling-houses and commercial premises to private enterprise, and up to 1876 the policy was put in operation with considerable success. But the commercial crisis of the following years practically brought the scheme to a standstill. It was not till 1889 that it took upon itself the task of rebuilding in earnest, and up to 1901 it had erected 46 tenement blocks, containing 200 shops and 1,456 dwelling houses, reconstructed old properties containing 342 additional dwellings, formed 30 new streets, and improved 26 old ones, and transformed a portion of the lands in the north-eastern quarter of the city, acquired under the 1866 Act, into a public park (the Alexandra Park, opened in 1872). Not one public house is allowed in these properties. Under the 1897 Act powers were obtained to deal similarly with other congested areas, to purchase a maximum of twenty-five acres within or near the boundaries of the city for the construction of houses for the

poorest class, and impose a new assessment on landlord and occupier for this purpose. The realisation of the extended scheme, which resulted in the provision of 520 additional houses for the poorest class, constitutes another landmark in the work of slum improvement and the provision of hygienic dwellings, which has deservedly placed Glasgow in the front rank as a progressive city. "As a type of the modern city," says Mr Shaw, a recent American writer on *Municipal Government in Great Britain*, "with highly developed and vigorous municipal life, and with complex, yet unified, industrial and social activities . . . Glasgow may well repay study. It combines in itself most remarkably all that is significant in the history of city government among peoples of British origin—that is to say, to study Glasgow is to study the progress of municipal institutions in every stage." Under the Housing and Town Planning Act of 1909, and the Housing (Scotland) Act of 1919, a grand scheme, drawn up by the Town Clerk, Sir John Lindsay, and a Special Committee of the Corporation, has been developed for the ultimate provision of 57,000 houses suitable for various grades of the working classes. Edinburgh and other cities have also put in operation similar schemes. The progress of municipal enterprise on its social side, which we have illustrated chiefly from the cases of Edinburgh and Glasgow, has also been exemplified by the application, if on a more limited scale, of general or special Acts in the case of the other large burghs. The scope of this enterprise was enlarged by the Housing Acts of 1890, 1900, and 1903, and the Town Planning Acts of 1909 and 1919. Other phases of it is the provision of public parks, of recreation grounds, such as bowling greens, golf courses, and lawn tennis courts, of museums, galleries, and public libraries, of music for the people, etc. In the rural districts much has also been done to improve the conditions of life, especially since the establishment of County Councils and their District Committees in 1889, and of the Local Government Board in 1894, recently transformed into the Board of Health.

The effect of improved sanitary conditions is observable in the diminution of the death rate. In the case of Edinburgh, for example, the rate per 1000 of population fell from 25.88 in 1863

to 14.39 in 1913. Among children under five years of age the reduction was from 93.29 to 33.6. There is apparent, however, a serious falling off in the birth rate during these fifty years. In 1861 it was 33.4; in 1913 it was only 20.0. In the case of Glasgow the death rate diminished from 29.6 per 1000 of population in 1870 to 16.4 in 1919. Between 1914 and 1919 the infant death rate fell from 133 to 114 per 1000 births. A great deal is being done, under the Notification of Births Acts, 1907 and 1915, to counteract the ravages of disease among children by means of Maternity and Child Welfare Schemes. Edinburgh, for instance, possesses a number of establishments, such as the Royal Maternity Hospital, the Hospital for Women and Children, several Child Health and Day Nurseries, which devote themselves to this object in co-operation with the Medical Officer of Health, and with financial aid from the Corporation. Five Child Welfare Centres or Day Nurseries have been established in Glasgow, and two Country Homes have been opened for the treatment of children suffering from malnutrition, rickets, and other infantile diseases. A third at Dalmuir is in course of construction, while there are thirteen centres in the city for infant consultations by four lady medical assistants. For the treatment of tuberculosis, Edinburgh has provided accommodation in the City Hospital, the Victoria Tuberculosis Dispensary, the Victoria Hospital, and the Polton Farm Colony with a special staff under Dr Williamson as Chief Tuberculosis Officer, and Sir Robert Philip as Consulting Tuberculosis Officer. Glasgow has six Tuberculosis Dispensaries, and provides 842 beds in hospitals and 155 in sanatoria, besides defraying the cost of treatment of a large number of patients elsewhere.

There is still, unfortunately, room enough for farther improvement in the matter of housing in both town and country, as appears from the Report of the Royal Commission on Housing, issued in 1917. The congested area in the large towns is still too common. Here is one of the examples in the Report taken from the Anderston District of Glasgow, " in which a whole street of high tenements, with dark and damp sunk flats below the level of the street (which is only 19 feet wide) has been wedged into a V-shaped space between two important converging thoroughfares.

One witness described this area as follows :—' The sunk flat houses even in a hot dry summer remain damp and unwholesome. The stairs down to these houses are almost invariably dark and dirty, the passages pitch dark on the brightest day, so that only by feeling along the walls can one discover the doors. The bulk of the houses are of the made-down type, very dark lobbies (now lighter by night than day owing to the Corporation's recommendation that incandescent burners be put on the stairhead lamps). In all these closes the stairs are filthy and evil smelling, water closets constantly choked, and foul water running down the stairs, sickly cats everywhere spreading disease. One street is known as ' The Coffin Close,' so bad is its repute—narrow stairs and dark twisting lobbies, with no light and absolutely no air.' "

The following shows the deplorable state of things in some of the mining districts :—" The ' Miners' Row ' of inferior class is often a dreary and featureless place, with houses dismal in themselves, arranged in monotonous lines or in squares. The open spaces are encumbered with wash-houses, privies, etc., often out of repair, and in wet weather get churned up into a morass of semi-liquid mud, with little in the way of solidly constructed road or footpath—a fact which greatly adds to the burdens of the over-wrought housewife. The houses vary greatly in construction, but a large number are of two types. The older is either a ' single end ' or ' but and ben,' according as it has one or two rooms. It has only one door, and the solid back wall is pierced only by the smallest of windows, if by any, so that through ventilation does not exist. Many of the older houses show the faults of their class—leaky roofs, damp walls, and uneven and broken floors—the last a source of particularly bitter complaint. In addition there are faults not found outside mining communities, the chief being broken plaster and fissures in the walls, where ' subsidence ' has been serious; while in the worst houses in the West of Scotland, the only place for the storage of coals is below the bed. The impossibility of domestic cleanliness and order where this is the case needs no enforcement. If the workers in a house are on different shifts, the task of the housewife is complicated by irregular meals and sleeping hours. If the

pit is a wet one, the miners' soaking clothes must be left at night by the kitchen fire; and as the kitchen is a sleeping apartment, even where there are one or two other rooms, the steam and the gas which are given off as the pit clothes dry are highly injurious to the children, who may be in one of the two large beds near by. In the absence of baths at the pithead, or in any save the newest houses, the miner on his return must take his bath in the scullery (if there is one), or in the inevitable publicity of the kitchen. With this accumulation of difficulties to contend with, the standard of cleanliness and neatness attained in many houses (though by no means in all) is a matter for genuine surprise and admiration. In the numerous cases, however, in which water has not been introduced into the houses, but must be fetched from a standpipe at the end of the row, a high standard of cleanliness cannot be looked for.

"The dreary and unkempt surroundings of many rows have been already referred to, but a word must be said as to the nature of the outhouses which fill the intervals between the rows. Occasionally there is a properly constructed common washhouse, but in the older villages more often only such makeshift and ramshackle wash-houses and coal-sheds as the miners have run up for themselves. But the chief of these unsightly structures are the privies. In the West of Scotland this often is the 'privy midden,' which has only in comparatively recent times been expelled from the cities, and still unhappily retains its place in the mining villages. It is a large erection, open on one side, where ashes and all other household refuse are thrown in, and closed (though often not adequately closed) on the side which serves as latrine. It is the only sanitary convenience in many rows; and it is so impossible to keep clean, so foul smelling, and so littered with filth of all sorts, that no decent woman can use it, while, if the children do so, it is at grave risk to their health of body and mind. Another case, one degree less bad, is that of the range of separate privies—one for each three or four houses in the row. Here things may be better if they are well kept, but the difficulty of keeping them well is enormous; and often locks are forced, and doors may even be wrenched off. These abominations are gradually being re-

placed by better sanitary appliances, but in some districts they are still the rule."

The general housing statistics given are very significant of the widespread shortage of sanitary houses in both town and country, and of the urgent need for amendment. The number of occupied houses in Scotland, according to the Report, is 1,041,591. Of these 83,577 are estimated to be uninhabitable, of which 25,908 are regarded as repairable, and 57,669 as unrepairable and requiring demolition : 55,761 new houses are required in respect of overcrowding and sub-letting. Adding these to the total of those needing demolition, the shortage works out at 113,430. The Commissioners are, however, of opinion that this number is short by 8,000 in the agricultural areas, making the total number of houses required 121,430. Of the million odd houses occupied in 1911, 129,730 consisted of one room, and 409,354 of two rooms, and a large percentage of these houses were not provided with proper sanitary conveniences. The need for improvement is most urgent in the large industrial centres, particularly in those of the Clyde and the West of Scotland—Glasgow, Lanarkshire, Dumbartonshire, and Renfrewshire; in the mining districts, especially Lanarkshire and Ayrshire, and, in a less degree, the Lothians and Fifeshire; and the crofting communities of the north and west. In the large towns the lack of adequate accommodation has a serious effect on the shrinking birth rate. In the selection of tenants landlords prefer small to large families, and this tends to discourage child rearing.

In summarising the conditions revealed by the mass of evidence adduced and demanding redress, the Majority Report, with which that of the Minority agrees in many essentials, emphasises the " unsatisfactory sites of houses and villages, insufficient supplies of water, unsatisfactory provision for drainage, grossly inadequate provision for the removal of refuse, widespread absence of decent sanitary conveniences, the persistence of the unspeakably filthy privy-midden in many of the mining areas, badly constructed, incurably damp labourers' cottages on farms, whole townships unfit for human occupation in the crofting counties and islands, primitive and casual provision for many of the seasonal workers, gross overcrowding and huddling of the

sexes together in the congested industrial villages and towns, occupation of one room houses by large families, groups of lightless and unventilated houses in the older burghs, clotted masses of slums in the great cities. To these, add the special problems symbolised by the farmed-out houses, the model lodging-houses, congested back lands, and ancient closes. To these, again, add the cottages a hundred years old in some of the rural villages, ramshackle brick survivals of the mining outbursts of seventy years ago in the mining fields, monotonous miners' rows flung down without a vestige of town plan or any effort to secure modern conditions of sanitation, ill-planned houses that must become slums in a few years, old houses, converted without necessary sanitary appliances and proper adaptation, into tenements for many families, thus intensifying existing evils, streets of new tenements in the towns developed with the minimum of regard for amenity."

This summary forms a grave indictment of the failure of previous legislation and the ameliorative efforts following on it to secure adequate social reform in the matter of housing in town and country alike. The Commissioners adduce among the obstacles to such reform " the failure of commercial enterprise to keep pace with housing needs, the failure of the Local Authorities, both of town and country, to appreciate the full value of their powers, the rapacity of property owners in their claims for compensation, the persistence of antiquated methods of arbitration, the absence of any definite basis for the assessment of compensation, the impotence of the arbiters to check speculative claims, the consequent enormous and deterrent expense of improvement schemes and reconstructive schemes, the impotence of the Local Authorities to control the prices of building sites within the city or of potential building land in the immediate neighbourhood, the absence of a direct obligation on any authority to see that adequate housing is provided for the whole community, the inadequate size, area, and resources of many Local Authorities, the absence of powers to require combination of authorities, the consequent impossibility of effective enforcement of statutes by the Central Authority, the insufficiency of the Central Authority's equipment, the unsatisfactory status of the Central

Authority itself . . . Both commercial enterprise and municipal enterprise have failed to keep pace with the steadily rising demand for more and better house-room."

They emphasise the importance of the relation of land to housing. " The question of the land is fundamental. If nothing is done to make it possible either for individuals or for public authorities to obtain building land at more reasonable prices than hitherto, housing reform will be paralysed at the outset. If the methods of compulsory requisition of lands, including land and other property, are not simplified, the exorbitant claims that have already stopped building schemes in the cities will continue to be raised." An adequate remedy is, they believe, only possible with the aid of the State, acting through the Local Authorities. " The State itself, through the Local Authorities, is alone in a position to assume responsibility. . . . Hitherto the Local Authorities, though their powers for the provision of houses are extensive, have, for various reasons, been restrained or have refrained from using them to any appreciable extent. We are satisfied that if those powers are to be exercised on the scale necessary to realise the programme we have set forth, the Local Authorities must be placed under an unmistakeable obligation to maintain a continuous and systematic survey of their housing accommodation, to ascertain how far private enterprise can meet the demands, but, failing provision of houses by other agencies, to undertake themselves—with financial assistance from the State—the necessary building schemes. Without such a definite obligation, exercised under direction of the Central Authority, we are satisfied that by no administrative machinery known to us can the necessary houses be provided." At the same time they condemn the proposal of the Minority that the State should subsidise employers of labour, landowners, and speculative builders. Whilst assuming full responsibility for housing, the State should place on the Local Authorities that of seeing to the provision of building. They recommend the strengthening of the Local Government Board as the Central Authority by an increase of its direct executive powers, as well as its membership and staff, and emphasise the paramount importance of empowering it to require the combination of existing authorities for all pur-

poses of public health and housing. They propose to transform it into a principal department of State under the designation of the Scottish Ministry of Health—a proposal which has taken effect in the Scottish Board of Health. Another radical condition of housing and health reform is the sweeping away of the one-room house, which is " incompatible with decent or wholesome family life."

17. Shadows of Social Life

Inadequate housing is not the only shadow of social life in Scotland. Drunkenness has long been a social evil of very grave magnitude. The poverty, squalor, vice, and crime of the slum districts of the large towns are largely traceable to this evil. But the drink demon lurks in every corner of the land and among all classes, and its shadow is a blot on the fair name of Scotland. Men and even women, boys and even girls, staggering along the streets, shouting, using foul language, quarrelling and fighting, are too common sights—an outrage on public decency, a disgrace to themselves and their country. There has, happily, been a gradual improvement in the general attitude towards this vice. In all classes drunkenness is now regarded as a degradation of both the individual and society. The excess in drinking at dinner parties and other social functions, characteristic of the eighteenth century and even the early nineteenth, is no longer tolerated. The upper classes, which so long set a flagrantly bad example to the lower in this respect, have learned better. What our grandfathers and great-grandfathers called drinking under the table has gone out of fashion. The drinking bout, in which former generations habitually indulged, is out of date. The public taste no longer provides the atmosphere in which the drinking songs of Burns found their natural expression. Even genius would fail to evoke a genuine response to the glorification of toping and topers. To every self-respecting person drunkenness is simply a form of beastliness. Its injurious physical effects are widely recognised and more and more emphasised by medical men, philanthropists, employers of labour, and the working classes them-

selves. Health statistics reveal it as a potent cause of disease and degeneration. The criminal statistics prove conclusively that it is one of the most fertile causes of crime, and that sobriety is the best adjunct of law-abiding. Its baneful economic effects are equally appreciated. It is responsible for a great deal of inefficiency and absence from work. According to the Report of the Inter-Departmental Committee, if the habit of excessive drinking were eradicated, three-fourths of the distress, poverty, and deterioration in the nation would disappear along with it. The tendency of such facts has been to excite a widespread sense of the gravity of the evil, to discredit the old excessive drinking habit, and to beget a strong public sense of the virtue of temperance, and the necessity of temperance reform on moral, physical, and economic grounds.

Temperance legislation, in its mildest form, in Scotland may be said to date from the Home-Drummond Act of 1828, which conferred on Justices of the Peace in counties and Magistrates in burghs the granting of certificates for the sale of liquor, with appeal to Quarter Sessions, and enacted penalties for breach of certificate. Twenty-five years later (1853) the Forbes Mackenzie Act reduced the hours of sale (8 a.m. to 11 p.m.), closed the public-houses on Sundays, prohibited the sale of drink in toll-houses situated within six miles of a licensed house, and restricted the licensed grocer to selling drink for consumption off the premises only. Subsequent legislation augmented the power of police supervision, restricted the granting of new licenses, empowered the Magistrates in burghs of less than 50,000 inhabitants to fix the closing hour at 10 p.m., prohibited the sale to children under 14, with certain exceptions, and dealt with the inebriate class.

In 1896 a Royal Commission was appointed to review the operation of the licensing laws. It reported in 1899, but failed to come to an unanimous decision, and the Act of 1903 incorporated a large proportion of the recommendations of both the Majority and the Minority Reports. It consolidated the licensing laws, adding new provisions and superseding old ones, and sought to check, by penalising more severely, immoderate drinking. It constituted a Licensing Court in burghs of 4,000

and over, and in counties, or districts of counties, as the County Council might determine. In burghs the Licensing Court consists of the Magistrates, in counties of members of the County Council and Justices of the Peace in equal proportions, the number of members varying with the population of the county. In both burghs and counties there is a Court of Appeal. Certificates are granted for a year or six months, and are renewable. But new certificates are subject to certain conditions as to the character of the applicant and the suitability of the premises for the purpose. Objection may be taken to the granting or renewal of a certificate by interested parties, and if the objection is sustained, the certificate shall not be granted or renewed. Breaches of certificate are punishable by fine, and involve liability to the forfeiture of the certificate. A third offence entails such forfeiture, in addition to an increased fine. Shebeening, or selling liquor in unlicensed premises, is punishable by heavy penalties, and persons found drinking on such premises are liable to a fine. Hawking exciseable liquors is also a punishable offence, and the prohibition to sell drink by a licensed grocer to be consumed on the premises is made more stringent. Disorderly conduct on licensed premises is punishable by fine, and drunkenness by fine or imprisonment, whilst it is illegal to sell liquor for a period of three years to those convicted four times for drunkenness. The authorities in the large towns were empowered to close the public-houses at 10 p.m. During the war the hours were drastically reduced by special legislation, still in force, with very beneficial results.

This legislation was due in part to the growing influence of the temperance movement in Scotland. This movement may be said to have started in 1825 with the agitation, on the part of the Scottish brewers, against the use of "ardent spirits," which contributed to the passing of the Home-Drummond Act in 1828. In the year following the passing of this Act, Mr Dunlop formed the Greenock Temperance Society. The Glasgow and West of Scotland Temperance Society, in whose formation William Collins, the bookseller, took an active part, followed within a couple of months. Other pioneers were Stewart Morris, Robert Kettle, Robert Smith, Professor James Miller, Dr A. Wallace,

and Dr Thomas Guthrie. In 1844 the Scottish Temperance League was founded at Falkirk on the total abstinence principle, and, by means of agitation by paid agents and publication, has carried on an active crusade against intemperance during the last three-quarters of a century. By and bye the churches took up the question by means of their Temperance Committees, and other associations, such as the Independent Order of Good Templars, the Independent Order of Rechabites, the Scottish Temperance and Permissive Bill Association, the Scottish Band of Hope, widened the movement, which has long been a force to be reckoned with in both political and social life.

A large section of the public, though not adhering to the principle of total abstinence professed by these societies, sympathises with their efforts to combat the drink evil, and it was due to the pressure of public opinion that the Scottish Temperance Act of 1913 was placed on the Statute Book. A time limit of seven years was fixed before the principle of local option could be put in operation, and it was not till the autumn of 1920 that the voting took place in all burgh and county areas in Scotland. It was not strictly a question between prohibition and non-prohibition, for the electors were given the choice of three alternatives—no change, no license, and the limitation of licenses. Practically, however, it proved to be a trial of strength between no change and no license, since the number of voters who preferred limitation was comparatively small. Judged by areas, those in favour of no change were in an overwhelming majority—504 out of a total of 586. For limitation the number was 35, for no license 47, or, deducting Dornoch, which subsequently, in a second vote, reversed its decision and voted no change, 46. Judged by the numbers voting, the majority was far less formidable, the total vote for no license being equal to nearly two-thirds of the total vote for no change. Moreover, for the carrying of any alternative it was essential, first, that thirty-five per cent. of the total voters on the roll in any given area should take part in the vote, and, second, that fifty-five per cent. of those voting should record their votes in its favour before no license could be carried. If a simple majority had been the test, the proportion of areas in favour of no license would have been considerably larger.

Counting by individual votes, the result sufficiently shows that widespread dissatisfaction with the present system prevails. Nor can the substantial majority in favour of no change be interpreted as a vote against reform. It only shows that a large number of voters regarded the alternative, no license, as an impracticable one, and the vote for no change thus did not necessarily imply that no change was in itself desirable. The extreme temperance party in insisting so uncompromisingly on no license, as the only cure for the evil, has itself to blame, to a certain extent at least, for its defeat.

Meanwhile the problem of drunkenness remains with us. Whilst the temperance party is closing its ranks for a fresh assault in due time, moderate people have suggested various expedients, such as a system of rationing, the substitution of the restaurant for the dram-shop, the elimination of self-interest by the nationalisation or municipalisation of the trade. The trade itself has drafted a bill for the reform of the public-house. The Bill is at least an evidence of the conviction, on its part, of the necessity of reform in the national interest. The chairman of the trade, however, can hardly be said to have made friends for the proposed measure by attacking the churches for the stand they have made in favour of local option. Surely this is a social as well as a political question, and the tragic effects of the drink evil with which every minister, elder, and member of the churches makes acquaintance, in greater or less degree, afford reason enough for organised action to counter it, though there may be difference of opinion as to methods.

Connected with drunkenness is sexual impurity, with the resultant evils of illegitimacy, divorce, prostitution, venereal disease, and relative crime. Bad housing, which renders decent family life an impossibility in the overcrowded areas of the towns, runs a neck-and-neck race with excessive drinking in nurturing this vice. In Scotland the percentage of illegitimate children has varied during the last sixty years from about 7 per cent. to 10 per cent. In 1855 it was 7.88, 10.27 in 1866, 6.21 in 1903. Since then it has averaged about 7.0. It has varied with the district, being highest in the counties of Banff, Elgin, and Wigtown, where in 1914 it was respectively 14.51, 14.27, and 13.41.

In the county of Dumbarton it was as low as 4.49. It was larger in the eastern districts, with a more extensively arable soil, than in the western. In the principal towns the highest was 9.79 in Edinburgh, the lowest 3.96 in Govan and Coatbridge. Taking Scotland as a whole the percentage of 7.29 compares unfavourably with England with 4.3, Wales with 5.4, and Ireland with 2.8. This unfavourable position is probably due to some extent to the fact that the law of Scotland rightly legitimates children born before marriage, should the parties afterward marry. The housing of unmarried farm servants of both sexes on the "bothy" system is another source of illegitimacy. Illegitimacy is, however, not a gauge of the extent of sexual immorality. In the towns, where the percentage of illegitimacy is generally less than in the counties, sexual immorality is far more prevalent in virtue of the fact not only that the opportunity of gratifying it is far more abundant, but the means of preventing pregnancy are more easily available.

Prostitution is one of the saddest features of town life. One cause of it is the bad housing of overcrowded areas, which makes a decent home environment for the girls of the family impossible, and predisposes them to become the prey of the seducer. Another is the inadequate earnings of working girls in many occupations. Alcoholism is an invariable concomitant as well as a cause. In Scotland establishments for this purpose are illegal, and the police are active in the crusade against them. The employment of women police, started during the war, is a step in the right direction. But prostitution in itself is not a crime. Known prostitutes can only be arrested if found importuning, and proof in the case of immoral houses is not easy. Whilst concerted prostitution is liable to prosecution, the individual prostitute who lives apart may practice her low vocation with impunity. Fines and imprisonment are not adequate deterrents, and the task of either reforming the prostitute or providing her with a new start in life is a very difficult one. The rescue home is at most but a palliative of what is an inveterate social disease, and the hope of anything like an effective remedy lies in the betterment of the social conditions that tend to feed this social malady, especially of home life and family upbringing in the poor quar-

ters of our cities, though the evil is by no means confined to any one class.

Among the evils inseparable from this vice is the widespread propagation of venereal disease, which first appeared in Scotland at the close of the fifteenth century. According to the evidence of the late Sir W. Osler, given in the Report of the Commission, which was appointed in 1913 to investigate the subject, and reported in 1916, " the number of persons who have been infected with syphilis, acquired or congenital, cannot fall below 10 per cent. in the large cities, and the percentage affected with gonorrhoea must greatly exceed this proportion." Besides the horrible physical suffering and misery caused by the disease in its worst forms, the economic loss is very serious. It unfits its victims permanently, or for longer or shorter periods, for work. In the Navy in 1912, for instance, with a strength of 119,540 men, it was responsible for a total loss of 269,210 days. In the case of the home Army with a strength of 107,582 men, the loss in days was 216,445. In the case of the civil population, for which exact statistics are not available, the Commissioners were of opinion that the loss would be found to be " extremely large," the civil population not having, at the date of the Report, the easy access to the best modern treatment provided for the Navy and Army. According to the same evidence, the disease is the cause of an enormous loss of child life and of a large proportion of sterility among men and women, and consequently materially contributes to the declining birth rate. It is responsible for more than half the percentage of blindness in children. Its ravages among the forces at home and abroad during the war were appalling. It can only be described as a plague, and the statistics constitute a terrible indictment of the demoralising effect of military service on the morals of hundreds of thousands of our young manhood. It undoubtedly constitutes a grave national danger, to eradicate which the most resolute measures are urgently needed. The Commissioners recommend that infectious venereal disease should form a bar to marriage, and that, if acquired after marriage, it should be a valid ground for divorce. They emphasise the necessity for the judicious and timely education of the young in the subject, and the extension of free medical

and hospital treatment for those afflicted with the disease. The latter recommendation has been put in force by the Local Government Board, which, in October 1916, issued an Order requiring Local Authorities to prepare schemes for the prevention, diagnosis, and treatment of venereal disease. Under this Order free treatment is provided to all persons suffering from any form of this disease. Special agencies of a voluntary character, like the Alliance of Honour, are also engaged in educating public opinion and combating the evil by means of religious and educational influences.

Divorce is an all too frequent result of sexual immorality. In proportion to population the percentage of divorces for adultery or desertion remained practically stationary for a considerable period before the war. The percentage was one divorce for every 170 marriages. The cases tried do not, however, represent the actual amount of misconduct of this kind, since casual cases of adultery are often condoned by the aggrieved party. Irregular marriages far more frequently end in divorce than regular, and those of young persons than those of couples of more mature age. The war has unfortunately led to a marked increase of these cases in both England and Scotland, and the increasing evidence of this unsound condition of family life is very disquieting. Little wonder that it has been the subject of unfavourable comment by some of the Judges, like Lord Sands, whose special duties bring them into touch with this form of social wreckage.

Another social evil which has become alarmingly prevalent is gambling,—the result partly of the lure of the excitement inherent in transactions which have the element of hazard, partly of the desire to make money by fictitious means. Of its extent the Report of the House of Lords Committee in 1902 bears explicit evidence. Betting, the Committee reported, is much more widespread, especially among the working classes, than it used to be. The increase has mostly taken place during the last thirty or forty years, and is due in large measure to the growing popularity of certain sports, cheap communication by post and telegraph, the rise of the popular press, and the decay of the spirit of thrift. Statistics of prosecutions for offences against the Betting and Gaming Acts confirm the conclusion of the Lords' Com-

mittee. In 1914 the number of convictions on this ground in Scotland was 764, whilst statisticians have estimated the present number of bookmakers in the United Kingdom at 30,000, compared with 20 at the beginning of the nineteenth century. A large number of crimes of dishonesty and of bankruptcies is due to losses through gambling. The amount of space devoted in the newspapers to betting news is another indication of what has become a sort of mania. It is only necessary to observe the eager hunt for the evening papers, with their detailed reports of horse racing or football matches, to realise that a large proportion of their readers are mercenarily interested in these, above all other items. It is rampant among all classes, but especially among the working classes, who stand to lose a large part of their earnings in its pursuit. Since the war it is said to have greatly spread among women workers. According to Mr Arthur Henderson, "gambling is a greater foe to labour than all the forces of capitalism." Other Labour leaders have spoken to the same effect, and its injurious tendency has been emphasised by competent representatives of other classes. Besides the material loss, betting has lowered legitimate sport, with the exception of cricket and Rugby football, which have escaped the contagion, into a scramble for gain. Other forms of gambling, like card playing, are also all too prevalent, though games of chance, like roulette, are illegal, and in Scotland the law against these and also lotteries is strictly enforced. The Stock Exchange is likewise too much dominated by the gambling spirit in the form of transactions which cannot be called genuine buying and selling, but are mere manipulations for gain at the expense of somebody else.

The physique of the nation, as tested by the medical examination of recruits during the year November 1917-October 1918, leaves much to be desired. Of every nine men of military age examined in Great Britain, three only were perfectly fit; two were able to undergo physical exertion which does not involve severe strain; three were fit for only a very moderate degree of exertion, and one was a chronic invalid. In the case of the industrial areas of Scotland physical condition was found to depend less on industrial than social conditions, such as housing and feeding. A very large number was graded low, not because

of actual disease, but because of disability arising from some physical defect which was preventable. A general feature was the large number of low graded men in unproductive occupations, such as clerks and grocers. Another was the disappointing physique of boys. Again, the percentage was higher for artisans, agricultural workers, and miners than for factory workers. The Report brings out the urgency of social reform and the importance of physical training in schools, and of healthy recreation in the hours of relaxation from work, which are far too apt to be devoted to unhealthy pastimes, such as habitual attendance at picture houses and football matches in place of regular participation in outdoor games.

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